U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1601 Kapiolani Blvd., Suite 1110
Honolulu, Hawaii 96814-4700
(808) 944-2200 ● Fax (808) 973-2941

Environmental Assessment

Annual Catch Limit Specification for Main Hawaiian Islands Deep 7 Bottomfish in 2011-12 (RIN 0648-XA470)

July 15, 2011

Responsible Agency: Pacific Islands Regional Office (PIRO)
National Marine Fisheries Service (NMFS)
National Oceanic and Atmospheric Administration (NOAA)

Responsible Official: Michael D. Tosatto
Regional Administrator
NMFS PIRO
1601 Kapiolani Blvd. Room 1110
Honolulu, HI 96814
(808) 944-2200

Responsible Council: Western Pacific Fishery Management Council
1164 Bishop St. Suite 1400
Honolulu, HI 96813
Contact: Kitty M. Simonds
Executive Director
(808) 522-8220

Abstract

Hawaiian bottomfish stocks are managed under the Fishery Ecosystem Plan for the Hawaiian Archipelago (Hawaii FEP), developed by the Western Pacific Fishery Management Council (Council), and implemented by NMFS under the authority of the Magnuson-Stevens Fishery Conservation and Management Act. Bottomfish are caught exclusively in the main Hawaiian Islands (MHI) in both state and federal waters. Target stocks include 14 species, but seven species (the Deep 7) account for nearly three-quarters of the total MHI bottomfish catch annually. The fishing year for Deep 7 bottomfish begins September 1 and ends on August 31 the following year. For all other Hawaii bottomfish stocks, the fishing year begins January 1 and ends on December 31.

Consistent with the Hawaii FEP, NMFS proposes an annual catch limit (ACL) of 346,000 lb for the main Hawaiian Islands Deep 7 bottomfish during the 2011-12 fishing year, and an annual catch target of 325,000 lb as an accountability measure (AM). The Council recommended the ACL and AM, based on the most recent bottomfish stock assessment, risk of overfishing, past

fishery performance, acceptable biological catch recommendation from the Council's Scientific and Statistical Committee, and input from the public.

This environmental assessment (EA) evaluates the potential environmental impacts of specifying a particular ACL from a range of values for fishing years 2011-12 and 2012-13. The assessment also evaluates the potential impacts of specifying a corresponding annual catch target (ACT) set below the ACL, and a second AM of closing the fishery when the ACT is projected to be reached. Seven alternatives for the ACL and their corresponding ACTs are considered. Alternative 5 is the preferred alternative. If approved for implementation, NMFS would specify an ACL of 346,000 lb with a corresponding ACT of 325,000 for the 2011-12 fishing year. When the ACT is projected to be reached, fishing for Deep 7 bottomfish in federal waters of the MHI would be closed through the end of the fishing year. The ACT specification and fishery closure serve as AMs to prevent the ACL from being exceeded.

The proposed ACL includes considerations of scientific and management uncertainty. There is no expected effect of the specification on target or non-target species, marine mammals, sea turtles, or seabirds. There also would not be any impacts on any designated essential fish habitat, marine protected areas, or critical habitat. The specification of an ACL and use of an ACT are expected to prevent overfishing from occurring and provide for sustainable harvest of bottomfish.

NMFS is seeking public comments on the proposed ACL and AM specification. Instructions on how to comment on the proposed specification, as well as instructions on how to obtain a copy of the document can be found by searching on RIN 0648-XA470 at www.regulations.gov, or by contacting the responsible official at the above address.

Contents

1.0 Background 7
1.1 Previous TAC Limits for MHI Deep 7 Bottomfish 8
1.2 Recent Changes to State MHI Bottomfish Fishery Management Measures 9
1.3 Annual Catch Limit and Accountability Measure Mechanism 9
1.4 Purpose and Need 11
1.5 Proposed Action 11
1.6 Decision to be Made 12
1.7 Public Involvement 12
2.0 Description of the Alternatives Considered 12
2.1 Development of the Alternatives 13
2.2 ACL Alternatives for the 2011-12 MHI Deep 7 Bottomfish Fishery 14
2.2.1 Alternative 1: Status Quo - Specify an ACL of 254,050 lb 15
2.2.2 Alternative 2: Specify an ACL between 255,000 and 295,900 lb 15
2.2.3 Alternative 3: Specify an ACL between 299,000 and 316,200 lb 15
2.2.4 Alternative 4: Specify an ACL between 319,000 and 337,270 lb 15
2.2.5 Alternative 5: Specify an ACL between 341,000 and 346,100 lb (Preferred) 16
2.2.6 Alternative 6: Specify an ACL between 349,690 and 358,340 lb 16
2.2.7 Alternative 7: Specify an ACL between 361,000 and 383,000 lb 16
2.3 Alternatives Not Considered in Detail 17
3.0 Affected Environment 18
3.1 Bottomfish Management Unit Species 18
3.2 Target Species 19
3.3 MHI Bottomfish Habitat 21
3.4 Bycatch 22
3.5 Stock Status 23
3.6 Protected Species 25
3.7 Essential Fish Habitat and Habitat Areas of Particular Concern 27
3.8 Economic, Social and Cultural Setting 31
3.8.1 The Economic Setting 31
3.8.2 Overview of Hawaii Fishing-Related Economic Activities 32
3.8.3 Overview of the MHI Bottomfish Fishery 32

3.8.4 Environmental Justice Communities 37
3.8.6 Fishing Communities 38
4.0 Anticipated Impacts of the Alternatives 38
4.1 Impacts to Target Stocks 39
4.2 Impact to Non-Target and Bycatch Species 41
4.3 Impacts on Protected Resources 42
4.4 Impacts to EFH and HAPC 43
4.5 Effects on Fishery Participants and Fishing Communities 43
4.6 Environmental Justice 46
4.7 Cumulative Impacts 47
4.8 Effects of Climate Change 47
4.9 Additional Considerations 48
4.9.1 Executive Order 12866 48
4.9.2 Relationship between local short-term uses and maintenance and enhancement of long-term productivity 48
4.9.3 Irreversible and Irretrievable Commitments of Resources 49
4.9.4 Consultation and Coordination 49
4.9.5 Preparers and Reviewers 50
5.0 References 50
Appendix 1: Range of Catches and the Associated Probability of Overfishing 53
Appendix 2: Final Report of the P* and SEEM Working Groups 54

Tables

Table 1. MHI Deep 7 TAC limits, fishery closure dates and actual catch, 2007-2010 9
Table 2. Summary of ACL alternatives for the 2011-12 and 2012-13 fishing year, including associated probabilities of overfishing and corresponding ACTs 16
Table 3. Hawaiian Archipelago bottomfish management unit species (BMUS) 19
Table 4. Ratio of Deep 7 bottomfish catch to total BMUS catch in the MHI reported in fishing years (2007, 2008 and 2009) 19
Table 5. EFH and HAPC for Hawaii FEP MUS 28
Table 6. Hawaii's gross domestic product 31
Table 7. Hawaii's direct income from major export industries 31
Table 8. Hawaii employment statistics 31
Table 9. Characteristics of the MHI Deep 7 bottomfish commercial fishing sector (2007-2010) 33
Table 10. Reported commercial catches (thousands of pounds) of Deep 7 bottomfish by Hawaiian Island group (fishing years 2007-08, 2008-09 and 2009-10) 34
Table 11. Reported commercial catches of MHI Deep 7 bottomfish (fishing year 1990-2010) .. 34

Table 12. MHI Deep 7 TAC limits, fishery closure dates and actual catch 2007-2010 35
Table 13. MHI Deep 7 bottomfish - monthly and cumulative lb caught (Sept. 2005-March 2011) 35
Table 14. MHI Deep 7 Bottomfish - monthly mean and max lb caught (Sept. 2005-March 2011) 36
Table 15. Projected cumulative catch of MHI Deep 7 bottomfish based on reported monthly mean and maximum catches 37

Figures

Figure 1. Relationship between OFL, ABC, ACL, and ACT 11
Figure 2. Expected values of OFL, ABC, ACL and ACT for MHI Deep 7 bottomfish..... 14
Figure 3. General location of bottomfish habitat in the main Hawaiian Islands 21

Acronyms and Abbreviations

ABC – Acceptable Biological Catch
ACL – Annual Catch Limit
ACT – Annual Catch Target
AM – Accountability Measure
BMUS – Bottomfish Management Unit Species
Council – Western Pacific Fishery Management Council
CPUE – Catch per Unit of Effort
Hawaii DLNR – Hawaii Department of Land and Natural Resources
EA – Environmental Assessment
FEP – Fishery Ecosystem Plan
FMP – Fishery Management Plan
FR – Federal Register
HDAR – Hawaii Division of Aquatic Resources
MHI – Main Hawaiian Islands
Magnuson-Stevens Act – Magnuson-Stevens Fishery Conservation and Management Act
MFMT – Maximum Fishing Mortality Threshold
MSST – Minimum Stock Size Threshold
MSY – Maximum Sustainable Yield
NMFS – National Marine Fisheries Service
NWHI – Northwestern Hawaiian Islands
OFL – Overfishing Limit
P* – Acceptable Risk or Probability of Overfishing
PIFSC – NMFS Pacific Islands Fisheries Science Center
SDC – Status Determination Criteria
SEEM – Social, economic, and ecological considerations, or management uncertainty (SEEM)
SSC – Scientific and Statistical Committee
TAC – Total Allowable Catch
WPFMC – Western Pacific Fishery Management Council

[This page intentionally left blank]

1.0 Background

Bottomfish fishing in federal waters around Hawaii is managed under the Fishery Ecosystem Plan for the Hawaiian Archipelago (Hawaii FEP), developed by the Western Pacific Fishery Management Council (Council), and implemented by the National Marine Fisheries Service (NMFS) under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). Until recently, the fisheries for Hawaiian bottomfish operated in two management subareas: (1) the inhabited main Hawaiian Islands (MHI) with their surrounding reefs and offshore banks; and (2) the Northwestern Hawaiian Islands (NWHI), a 1,200-nautical mile (nm) chain of largely uninhabited islets, reefs, and shoals. In 2009, the NWHI fishery was closed in accordance with the Presidential Proclamation establishing the Papahanaumokuakea Marine National Monument (Monument), which prohibits commercial fishing, although sustenance fishing for bottomfish is allowed to continue in accordance with Monument regulations (71 FR 51134, August 29, 2006). At present, bottomfish fishing managed under the Hawaii FEP only occurs in the MHI.

The MHI bottomfish fishery harvests an assemblage, or complex, of 14 species that include nine snappers, four jacks or trevally and a single species of grouper. However, the target species of the fishery, and the species of primary management concern are six deep-water snappers and the grouper. Termed the "Deep 7 bottomfish," they include onaga (*Etelis coruscans*), ehu (*Etelis carbunculus*), gindai (*Pristipomoides zonatus*), kalekale (*Pristipomoides sieboldii*), opakapaka (*Pristipomoides filamentosus*), lehi (*Aphareus rutilans*), and hapuupuu (*Epinephelus quernus*). Federal requirements for the MHI bottomfish fishery include vessel identification, non-commercial fishing permits, non-commercial catch and effort logbooks, a non-commercial bag limit of five Deep 7 bottomfish per trip, and the specification of an annual catch limit (ACL) for all stocks or stock complexes in the fishery, including accountability measures (AMs) for adhering to the catch limit. For management purposes, the fishing year for the MHI Deep 7 bottomfish complex begins on September 1 and ends on August 31 the following year. For all other bottomfish stocks, the fishing year begins January 1 and ends on December 31.

For the past four fishing years (2007-2010), the MHI bottomfish fishery was managed through a total allowable catch (TAC) limit that was applied to the Deep 7 bottomfish complex only. The TAC system was created in response to a 2005 determination by NMFS that overfishing was occurring on the archipelagic-wide bottomfish multi-species complex (archipelagic bottomfish stocks) with the primary problem being excessive fishing mortality on the Deep 7 bottomfish species in the MHI (73 FR 18450, April 4, 2008). To end and prevent overfishing, the MHI Deep 7 bottomfish TAC was specified annually by NMFS, as recommended by the Council based upon the best available scientific, commercial, and other information. NMFS and the State of Hawaii monitored progress towards the TAC based on commercial bottomfish landing data submitted to the state by commercial marine license (CML) holders, and when the TAC was projected to be reached, NMFS closed the commercial and non-commercial MHI Deep 7 bottomfish sectors in federal waters until the end of the fishing year. Hawaii law allows the state to adopt a complementary closure for MHI Deep 7 bottomfish in state waters. To keep fishermen and the public informed on progress towards the TAC and the projected in-season closure date, catch information is posted online throughout each fishing year at www.fpir.noaa.gov and www.hawaiibottomfish.info.

1.1 Previous TAC Limits for MHI Deep 7 Bottomfish

2007-08 Fishing Year

Based on a 2006 stock assessment (Moffitt et al. 2006) prepared by NMFS Pacific Islands Fisheries Science Center (PIFSC), the MHI Deep 7 bottomfish TAC for the 2007-08 fishing year was set at 178,000 lb (73 FR 18450, April 4, 2008). This TAC represented a 24 percent reduction in fishing mortality based on 2004 data, and was necessary to end overfishing on the archipelagic bottomfish stocks. Monitoring of commercial catch toward the TAC began on October 1, 2007, and the MHI Deep 7 bottomfish fishery was closed on April 16, 2008 (73 FR 18717, April 7, 2008). However, due to a lag in commercial fishermen catch report submittals (which until October 2010, was allowed to be submitted by the 10th day of the month following a fishing trip pursuant to state law), the final catch total for 2007-08 was 196,147 lb of Deep 7 bottomfish (18,147 lb or 10.2 percent greater that the specified TAC) (HDAR 2010).

2008-09 Fishing Year

Based on an overfishing risk assessment completed by PIFSC in 2008 (Brodziak et al. 2008), and a draft 2008 bottomfish stock assessment update (Brodziak et al. 2009), the MHI Deep 7 bottomfish TAC for the 2008-09 fishing year was set at 241,000 lb (74 FR 6998, February 12, 2008). The TAC had a zero risk of overfishing the archipelagic bottomfish stocks and a 40 percent risk of localized depletion (i.e., risk of overfishing) of the MHI subarea bottomfish stocks. This stock assessment update also found that archipelagic bottomfish stocks were no longer subject to overfishing. Monitoring of commercial catch toward the 2008-09 TAC began on September 1, 2008, and the MHI bottomfish fishery was closed on July 6, 2009 (74 FR 27253, June 9, 2009). Due to the lag in commercial catch report submittals, the final catch total for 2008-09 was 259,194 lb of Deep 7 bottomfish (HDAR 2010). This catch was 18,194 lb or 7.5 percent greater than the specified TAC.

2009-10 Fishing Year

For the 2009-10 MHI Deep 7 fishing year, the TAC was set at 254,050 lb (74 FR 48422, September 23, 2009). This TAC, developed by the Council's SSC was based upon MHI Deep 7 bottomfish catch data from 1982-2007. The average catch for the MHI Deep 7 bottomfish for that time period was 339,698 lb, and the median catch was 308,526 lb, with the 25th percentile being 254,050 lb. Based on the overfishing risk analyses contained in the final 2008 stock assessment update from PIFSC (Brodziak et al. 2009), the 254,050 lb TAC was associated with zero risk of overfishing the archipelagic bottomfish stocks, and between 39 and 44 percent risk of localized depletion of the MHI subarea bottomfish stocks (74 FR 42641, August 24, 2009). Monitoring of commercial catch toward the 2009-10 TAC began on September 1, 2009, and the MHI bottomfish fishery was closed on April 20, 2010 (75 FR 170701 April 5, 2010). Due to a combination of adverse weather conditions, and inadvertent duplication of accounting Deep 7 landings from manually submitted commercial catch reports and a newly implemented online reporting system, the final catch total for 2009-10 was 208,412 lb of Deep 7 bottomfish (-45,638 lb or 17.9 percent short of the specified TAC) (HDAR 2010).

2010-11 Fishing Year

For the 2010-11 MHI Deep 7 fishing year, the TAC was set again at 254,050 lb (75 FR 53606, September 1, 2010) and was associated with zero risk of overfishing the archipelagic bottomfish stocks, and between 33 and 38 percent risk of localized depletion of the MHI subarea bottomfish stocks (75 FR 45086, August 2, 1010). Monitoring of commercial catch toward the 2010-11 TAC began on September 1, 2009, and the MHI bottomfish fishery was closed on March 12, 2011 (76 FR 10524, February 25, 2011). The actual MHI Deep 7 catch realized in the 2010-11 fishing year is 268,089 lb. This catch is 14,039 lb or 5.5 percent higher than the specified TAC (HDAR unpublished data). Table 1 summarizes the MHI Deep 7 bottomfish TAC limits, fishery closure dates, and actual catches for the 2007-08 through the 2010-11 fishing years.

Table 1. MHI Deep 7 TAC limits, fishery closure dates and actual catch, 2007-2010

Fishing Year	Specified TAC Limit (lb)	Date Fishery Closed	Actual Catch Total (lb)	Overage (+)/ Underage (-)
2007-2008	178,000	Apr. 16, 2008	196,147	+18,147 lb (10.2%)
2008-2009	241,000	Jul. 6, 2009	259,194	+18,194 lb (7.5%)
2009-2010	254,050	Apr. 20, 2010	208,412	-45,638 lb (-17.9%)
2010-2011	254,050	Mar. 12, 2011	268,089	+14,039lb (5.5%)

Source: HDAR 2010 (fishing year 2007-10); HDAR unpublished data (fishing year 2010-11)

1.2 Recent Changes to State MHI Bottomfish Fishery Management Measures

In October 2010, the State of Hawaii Department of Land and Natural Resources (DLNR) revised the Hawaii Administrative Rules (HAR) pertaining to bottomfish management in state waters. The new rule established a requirement for CML holders to report all bottomfish catches within five days after the end of a trip (HAR 13-74-20; effective October 18, 2010). Prior to this rule change, catch reports were required by the 10th day of the month following a fishing trip. This allowed reports to be submitted up to 40 days after a fishing trip. The intent of the rule change was to improve the accuracy in monitoring of catch towards the catch limit by minimizing delay in catch report submittals. The rule also changed the State's non-commercial bag limit from five ehu or onaga or a combination of these two species per-day, to a bag limit of any five Deep 7 bottomfish per day (HAR 13-94-7, effective October 18, 2010). The intent of the change is to make state law the consistent with the federal bag limit for non-commercial for Deep 7 bottomfish. The rule also changed the requirement for a one-time bottomfish vessel registration to an annual renewal. This change was needed to update the state database of all registered commercial and non-commercial bottomfish vessels, and to help ensure that the list is kept current (HAR 13-94-9, effective October 18, 2010).

1.3 Annual Catch Limit and Accountability Measure Mechanism

Pursuant to Amendment 3 to the Hawaii FEP, there are three required elements in the ACL mechanism. The first requires the Council's SSC to calculate an acceptable biological catch (ABC) that is set at or below the stock's overfishing limit (OFL). For stocks like Hawaii bottomfish that have estimates of OFL, maximum sustainable yield (MSY) and other MSY-based reference points derived from statistically-based stock assessment models (Tier 1-3 quality data), the ABC is calculated by the SSC based on an ABC control rule that accounts for scientific uncertainty in the estimate of the OFL, and the acceptable level of risk (as determined by the

Council) that catch equal to the ABC would result in overfishing. In plain English, ABC is the maximum value for which the probability or risk of overfishing (P*) is less than 50 percent. By law, the probability of overfishing cannot exceed 50 percent and should be a lower value (74 FR 3178, January 9, 2011). Amendment 3 to the Hawaii FEP includes a qualitative process by which the P* value may be reduced below 50 percent based on consideration of four dimensions of information, including assessment information, uncertainty characterization, stock status, and stock productivity and susceptibility.

The second element requires the Council to determine an ACL that may not exceed the SSC recommended ABC. Amendment 3 to the Hawaii FEP includes methods by which the ACL may be reduced from the ABC based on social, economic, and ecological considerations, or management uncertainty (SEEM). An ACL set below the ABC further reduces the probability that actual catch will exceed the OFL and result in overfishing, but ACL the may be set equal to ABC if an annual catch target (ACT) is used.

The third and final element in the ACL mechanism is the inclusion of AMs. AMs prevent ACLs from being exceeded and correct or mitigate overages of ACLs if they occur. For example, AMs may include, but are not limited to, closing the fishery, closing specific areas, changing bag limits, or other methods to reduce catch. An ACT may also be used in the system of AMs so that an ACL is not exceeded. An ACT is the management target of the fishery and accounts for management uncertainty in controlling the actual catch at or below the ACL.

If the Council determines that an ACL has been exceeded, the Council may recommend as an AM, that NMFS reduce the ACL in the subsequent fishing year by the amount of the overage. In determining whether an overage adjustment is necessary, the Council would consider the magnitude of the overage and its impact on the affected stock's status. Additionally, if an ACL is exceeded more than once in a four-year period, the Council is required to re-evaluate the mechanism of ACLs and AMs, and adjust the system, as necessary, to improve its performance and effectiveness. Figure 1 illustrates the relationship between the terms used in this section.

For more details on the specific elements of the ACL mechanism, see Amendment 3 to the Hawaii FEP and the final implementing regulations (76 FR 37286, June 27, 2011). The ACL mechanism supersedes the TAC system for the MHI Deep 7 bottomfish fishery starting in the 2011-12 fishing year. ACLs will be required for all other bottomfish stocks starting in the 2012 fishing year, which begins January 1, 2012.

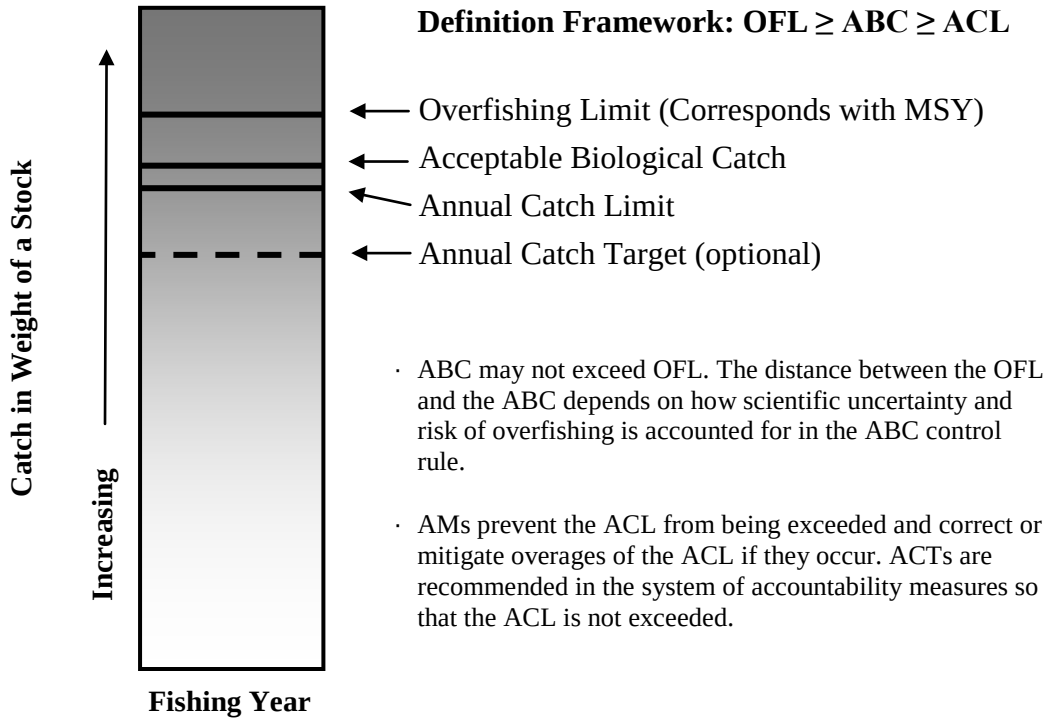


Figure 1. Relationship between OFL, ABC, ACL, and ACT

1.4 Purpose and Need

The ACL is needed in order to comply with the Magnuson-Stevens Act and provisions of the Hawaii FEP that require NMFS to specify an ACL for all stocks or stock complexes in the Hawaii bottomfish fishery. The Council developed its recommendation for the ACL and AMs in accordance with the approved FEP mechanism and process, considering the best available scientific, commercial, and other information about the fishery. Provisions of the Hawaii FEP also require AMs be implemented to ensure the ACL specification is not exceeded and to correct or mitigate overages of ACLs if they occur. The fishery management objective is to specify an ACL and AMs that will prevent overfishing from occurring, and ensure long-term sustainability of Hawaii's bottomfish stocks while allowing fishery participants to continue to benefit from the managed harvest of the fishery resources.

1.5 Proposed Action

The proposed federal action is the specification of an ACL and AMs for the Deep 7 bottomfish stock complex in the MHI for the 2011-12 fishing year. The ACL specification is based upon a PIFSC 2010 stock assessment that takes into consideration bottomfish life history information, commercial catch data submitted to the State by commercial marine license (CML) holders, and research monitoring data. The fishing year for MHI Deep 7 bottomfish opens September 1, 2011 and ends on August 31, 2012. Catches to be counted towards the ACL would be calculated from the opening of the fishery based on catch data submitted to the State by CML license holders. In order to help ensure the MHI Deep 7 bottomfish ACL is not exceeded, the proposed federal action also includes specifying an annual catch target (ACT) that is set below the ACL, so when the ACT is projected to be reached, NMFS would close commercial and non-commercial

fisheries for MHI Deep 7 bottomfish in federal waters through the end of the fishing year. During the closure, no person may fish for or possess any Deep 7 bottomfish in the MHI management sub-area, or sell such species anywhere, except as otherwise authorized by law.

The recommended (preferred) ACL for MHI Deep 7 bottomfish for the 2011-12 fishing year is 346,000 lb and is identical to the 346,000 lb ABC recommended by the Council's SSC. Based on risk projections contained in the PIFSC 2010 bottomfish stock assessment update (Brodziak et al., in press), an ABC/ACL of 346,000 lb is associated with approximately a 40.8 percent probability of overfishing the MHI Deep 7 bottomfish stock complex in fishing year 2011-12. The risk would be the same if the ABC and ACL were to be set at 346,000 lb in fishing year 2012-13. The proposed action would also establish an ACT at 325,000 lb, which is approximately six percent below the ACL. This six percent reduction is based upon social, economic, and ecological considerations, and management uncertainty (SEEM), and is intended to serve as an AM to prevent the ACL from being exceeded.

1.6 Decision to be Made

After considering public comments on the proposed ACL and AM alternatives, NMFS will specify an ACL for the MHI Deep 7 bottomfish stock complex for fishing year 2011-12, including an ACT and fishery closure as AMs to prevent the ACL from being exceeded. The Regional Administrator will also use the information in this EA to make a determination about whether or not the specification of the ACL and AMs would be a major federal action with the potential to have a significant environmental impact that would require the preparation of an environmental impact statement.

1.7 Public Involvement

At its 151st meeting, the Council considered and discussed issues relevant to the 2011-12 MHI Deep 7 bottomfish ACL and AMs including the acceptable probability of overfishing (P*), SEEM considerations, the 107th SSC's recommended ABC, and the range of ACLs considered in this EA and their corresponding ACTs. The 107th SSC meeting held June 13-15, 2011, and the 151nd Council meeting, held June 15-18, 2011 were both open to the public and advertised in Hawaii media as well as the Federal Register (76 FR 30107, May 24, 2011).

2.0 Description of the Alternatives Considered

The alternatives considered in this EA are limited to the ACL and AMs as they are the management measures to be applied to the fishery for the MHI Deep 7 bottomfish stock complex. Although the OFL and ABC are part of the ACL mechanism, the establishment of these reference points is not part of the proposed federal action, but is described for informational purposes.[1]

[1] OFL is an estimate of the catch level above which overfishing is occurring and was estimated in NMFS PIFSC's stock assessment of the main Hawaiian Islands deep 7 bottomfish complex through 2010 (Brodziak, et al. in press). ABC accounts for scientific uncertainty in the estimate of OFL and was calculated at the 107th meeting of the Council's SSC. OFL and ABC are biologically-based reference points and are not part of the federal action.

2.1 Development of the Alternatives

Estimation of OFL

An updated stock assessment of the MHI Deep 7 bottomfish stock complex was conducted by PIFSC through fishing year 2010 and included projection results of a range of commercial catches of Deep 7 bottomfish that would produce probabilities of overfishing ranging from zero percent to 100 percent, and at five percent intervals in fishing year 2011-12, and in 2012-13 (Brodziak et al., in press, Table 17.1, and shown in Appendix 1). The 2010 stock assessment uses similar commercial fishery data as in the previous 2008 stock assessment update (Brodziak et al. 2009), but includes a modified treatment of unreported catch and catch per unit of effort (CPUE) standardization, as well as new research information on the likely life history characteristics of bottomfish (A. Andrews, PIFSC, unpublished 2010 research). See section 3.5 below for an overview of the 2010 stock assessment.

According to the 2010 stock assessment update, the Catch 2/CPUE 1 scenario combination represents the best approximation (with a 0.400 probability) of the true state of nature of the bottomfish fishery and Deep 7 bottomfish population dynamics. Under the Catch 2/CPUE 1 scenario combination, the long-term maximum sustainable yield (MSY) of the MHI Deep 7 bottomfish stock complex is estimated to be 417,000 lb. The assessment model also estimates that the catch limit associated with a 50 percent probability of overfishing the MHI Deep 7 bottomfish complex in fishing year 2011-12 and again in fishing year 2012-13 is 383,000 lb. Therefore, while the long-term MSY for the fishery is 417,000 lb, the OFL for the 2011-12 and 2012-13 fishing years is estimated to be 383,000 lb.

Calculation of ABC

Since the PIFSC 2010 stock assessment used statistical-based models to estimate OFL and uncertainty in OFL for the MHI Deep 7 bottomfish stock complex, the assessment qualifies as a Tier 1-2[2] assessment. Therefore, in accordance with the Council's ACL mechanism, the Council must advise the SSC on the acceptable P* to apply in the Tier 1-2 ABC control rule to calculate ABC. P* cannot exceed 50 percent and should be a lower value.

At its 150th meeting held March 7-10, 2011, the Council formed a working group to assist it in determining the acceptable P* whereby P* would be set below 50 percent based on consideration of four dimensions of information, including assessment information, uncertainty characterization, stock status, and stock productivity and susceptibility as required by the Hawaii FEP. Upon evaluation of the 2010 PIFSC stock assessment, the working group determined that a P* of 40.8 percent was appropriate for the 2011-12 fishing year (See Appendix 2) and presented its methodologies, rationale and findings to the 107th meeting of the SSC and the 151st Council meeting. Both the SSC and the Council endorsed the outcomes of the P* working group, including the group's P* of 40.8 percent. Based on the risk projections contained in Table 17.1 in Brodziak et al., in press, the SSC determined a P* of 40.8 percent corresponds to a catch of approximately 346,000 lb and recommended the ABC for the MHI Deep 7 bottomfish stock complex be set at that level.

[2] A "Tier 1-2" assessment refers to a stock assessment that has a moderate to high level of information available for a given fish stock. Amendment 3 of the Hawaii FEP describes the specified approach the SSC must use to calculate an ABC stocks with a Tier 1-2 assessment (76 FR 14367, March 16, 2011).

Council ACL and AM Recommendations

At its 150th meeting, the Council formed a second working group to assist it in reviewing social, economic, and ecological considerations, or management uncertainty (SEEM) information for specifying an ACL at or below the ABC. The working group was comprised of federal and state fisheries scientist, economists, and fishermen. Based on this analysis, the working group determined that ACL should be set equal to ABC, but given the historical tendency for the fishery catch to exceed the allowable catch limits, that an ACT should be used and specified at six percent below the ACL. The outcomes of the SEEM working group (see Appendix 2) were also presented to the 107th SSC and 151st Council meeting and endorsed by both bodies. Based on this information, the Council recommended that the ACL for the MHI Deep 7 bottomfish fishery for fishing year 2011-2012 be set equal to the ABC at 346,000 lb. However, to ensure the ACL is not exceeded, the Council recommended that an ACT be used and set at 6 percent below ACL or 325,000 lb. Figure 2 illustrates the relationship and expected values of MSY, OFL, ABC, ACL and ACT for MHI Deep 7 bottomfish in fishing year 2011-12 under the Council's recommendation.

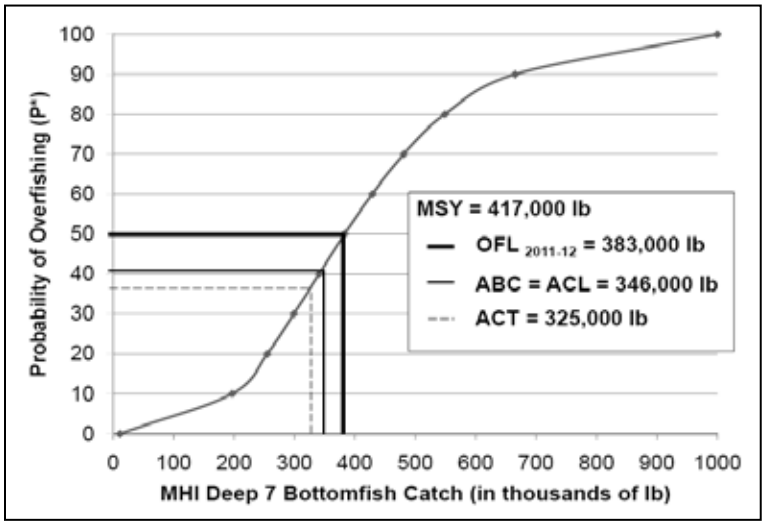


Figure 2. Expected values of OFL, ABC, ACL and ACT for MHI Deep 7 bottomfish

2.2 ACL Alternatives for the 2011-12 MHI Deep 7 Bottomfish Fishery

Features common to all alternatives

The alternatives cover a range of ACL alternatives for the MHI Deep 7 bottomfish stock complex that were developed by Council staff based upon the Catch 2/CPUE 1 scenario combination described in PIFSC 2010 bottomfish stock assessment update (Brodziak et al., in press). These alternatives, including the specific ACL values and their associated probabilities of overfishing (shown in table 2), were presented and discussed at the 107th SSC and 151st Council meeting.

According to provisions of the Hawaii FEP, the ACL specification may not exceed the ABC recommendation made by the Council's SSC. For all ACL alternatives, a corresponding ACT

would be specified at six percent below the ACL and, when the ACT is projected to be reached, NMFS would close commercial and non-commercial fisheries for MHI Deep 7 bottomfish in federal waters through the end of the fishing year. Each alternative assumes continuation of complementary in-season closure in state waters upon attainment of the ACT. Under all alternatives, other bottomfish management measures in the Hawaii FEP will remain in effect and commercial fishing in the NWHI will remain prohibited. Additionally, the state's recent change from monthly to trip reporting is intended to minimize the lag in commercial fishermen catch report submittals and is expected to improve the precision of in-season monitoring and controlling the actual catch at or below the ACL.

2.2.1 Alternative 1: Status Quo - Specify an ACL of 254,050 lb

Under Alternative 1, the ACL for the MHI Deep 7 bottomfish stock complex in fishing year 2011-12 would be set at 254,050 lb, which is identical to the catch limit specified for the 2010-11 fishing year. Alternative 1 is the status quo and, therefore, is the environmental baseline against which the impact of the other proposed ACL specifications for 2011-12 may be compared. Based on the probabilities of overfishing contained in the 2010 bottomfish stock assessment update (Table 17. 1 in Brodziak et al. in press), an ACL of 254,050 lb is associated with less than a 20 percent probability of overfishing the MHI Deep 7 bottomfish stock complex in fishing year 2011-12, and decreasing to a less than a 19 percent probability of overfishing if the same ACL is specified again for the 2012-13 fishing year. Under this alternative, the ACT would be reduced from the ACL by set at six percent (-15,250 lb) or 238,800 lb.

2.2.2 Alternative 2: Specify an ACL between 255,000 and 295,900 lb

Under Alternative 2, the MHI Deep 7 bottomfish stock complex ACL would be specified at a value between 255,000 and 295,900 lb. Based on the 2010 stock assessment update, an ACL within this range would be associated with a 20-29 percent probability of overfishing the MHI Deep 7 bottomfish stock complex, decreasing to approximately a 19-28 probability of overfishing if the same ACL is specified again for the 2012-13 fishing year. Depending on the specific ACL selected, the ACT would be reduced from the ACL by values between 15,300 and 17,750 lb resulting in an ACT between 239,700 and 278,150 lb.

2.2.3 Alternative 3: Specify an ACL between 299,000 and 316,200 lb

Under Alternative 3, the MHI Deep 7 bottomfish stock complex ACL would be specified at a value between 299,000 and 316,200 lb. An ACL within this range would be associated with a 30-34 percent probability of overfishing the MHI Deep 7 bottomfish stock complex, decreasing to approximately a 29-33 probability of overfishing if selected again for the 2012-13 fishing year. Depending on the specific ACL selected, the ACT would be reduced from the ACL by values between 17,940 and 19,000 lb resulting in an ACT between 281,060 and 297,200 lb.

2.2.4 Alternative 4: Specify an ACL between 319,000 and 337,270 lb

Under Alternative 4, the MHI Deep 7 bottomfish stock complex ACL would be specified at a value between 319,000 and 337,270 lb. An ACL within this range would be associated with a 35-39 percent probability of overfishing the MHI Deep 7 bottomfish stock complex, decreasing to approximately a 34-38 probability of overfishing if selected again for the 2012-13 fishing

year. Depending on the specific ACL selected, the ACT would be reduced from the ACL by values between 19,140 and 20,230 lb, resulting in an ACT between 299,860 and 317,040 lb.

2.2.5 Alternative 5: Specify an ACL between 341,000 and 346,100 lb (Preferred)

Under Alternative 5, the MHI Deep 7 bottomfish stock complex ACL would be specified at a value between 341,000 and 346,100 lb. An ACL within this range would be associated with a 40-41 percent probability of overfishing the MHI Deep 7 bottomfish stock complex in fishing year 2011-12 and 2012-13. Depending on the specific ACL selected, the ACT would be reduced by values between 20,460 and 20,770 lb resulting in an ACT between 320,540 and 325,330 lb. For the 2011-12 fishing year, the NMFS would specify the ACL at 346,000 lb, as recommended by the Council. This ACL is equal to the fishing level recommendation (ABC) set by the Council's SSC and would be associated with 40.8 percent probability of overfishing the MHI Deep 7 bottomfish stock complex in fishing years 2011-12 and again in 2012-13 if selected again. As an additional buffer to prevent the ACL from being exceeded, an ACT would be used and specified at 325,000 lb. The difference between ACL and ACT is a reduction of 21,000 lb.

2.2.6 Alternative 6: Specify an ACL between 349,690 and 358,340 lb

Under Alternative 6, the MHI Deep 7 bottomfish stock complex ACL would be specified at a value between 349,690 and 358,340 lb. An ACL within this range would be associated with a 42-44 percent probability of overfishing the MHI Deep 7 bottomfish stock complex in fishing year 2011-12 and 2012-13. Depending on the specific ACL selected, the ACT would be reduced from the ACL by values between 20,980 and 21,500 lb., resulting in an ACT between 328,710 and 336,840 lb.

2.2.7 Alternative 7: Specify an ACL between 361,000 and 383,000 lb

Under Alternative 7, the MHI Deep 7 bottomfish stock complex ACL would be specified at a value between 361,000 and 383,000 lb. An ACL within this range would be associated with a 45-50 percent probability of overfishing the MHI Deep 7 bottomfish stock complex, remaining the same for the 2012-13 fishing selected again. Depending on the specific ACL selected, the ACT would be reduced from the ACL by values between 21,660 and 22,980 lb, resulting in an ACT between 339,340 and 360,020 lb.

Table 2. Summary of ACL alternatives for the 2011-12 and 2012-13 fishing year, including associated probabilities of overfishing and corresponding ACTs

Alternative	**Proposed ACL for MHI Deep 7 Stock complex (lb)***	**Probability of overfishing MHI Deep 7 complex (%)***		**ACT (*-6% of ACL*)****
		Fishing Year 2011-12	*Fishing Year 2012-13*	
Alternative 1 (Status Quo)	254,050 lb	>20	>19	238,800
Alternative 2	255,000 – 295,900	20-29	19-28	239,700 to 278,150
Alternative 3	299,000	30	29	281,060
	303,400	31	30	285,200
	307,960	32	31	289,480

	311,850	33	32	293,140
	316,200	34	33	297,200
Alternative 4	319,000	35	34	299,860
	324,130	36	35	304,680
	330,140	37	36	310,330
	334,800	38	37	314,710
	337,270	39	38	317,040
Alternative 5	341,000	40	40	320,540
(Preferred)	346,100	41	41	325,330
Alternative 6	349,690	42	42	328,710
	354,570	43	43	333,300
	358,340	44	44	336,840
Alternative 7	361,000	45	45	339,340
	367,270	46	46	345,230
	372,930	47	47	350,560
	376,380	48	48	353,800
	379,630	49	49	356,850
	383,000	50	50	360,020

* Based on Table 17.1 in Brodziak et al., (in press) with individual calculations provided by J. Brodziak (pers. comm., May 13, 2011)
** ACT values are rounded to the nearest tens value

2.3 Alternatives Not Considered in Detail

Specification of a MHI Deep 7 TAC
Under this alternative, instead of an ACL, NMFS would specify a TAC for MHI Deep 7 bottomfish stock complex for fishing year 2011-12 as it has done so for the previous four fishing seasons. However, specification of a TAC no longer complies with the Magnuson-Stevens Act and regulations implementing the ACL mechanism of the Hawaii FEP (76 FR 37286, June 27, 2011). For this reason, this alternative is not discussed in detail.

Specification of separate State and Federal ACLs and corresponding ACTs
Under this alternative, the overall ACL and corresponding ACT would be divided into a federal ACL/ACT and a state ACL/ACT based on the proportion of the overall catch that was harvested from each jurisdictional area, respectively. To meet the fishery management objective of preventing overfishing, the State of Hawaii would be required to specify an ACL and ACT to be applied in state waters. However, if the State of Hawaii did not implement a state-ACL and ACT, NMFS would have no ability to prevent the overall ACL from being exceeded. Since NMFS cannot compel the State of Hawaii to enact rules and regulations to specify a state-ACL and ACT, this alternative was not considered in detail.

ACLs based on alternative Catch/CPUE scenarios
Under this alternative, NMFS would specify an ACL based on an alternative Catch/CPUE scenario combination presented in Brodziak et al. (in press). The ACL alternatives and their associated probabilities of overfishing described in Section 2.2 are based on the Catch 2/CPUE 1 scenario combination and represents the best approximation (with a 0.400 probability) of the true

state of nature of the bottomfish fishery and Deep7 bottomfish population dynamics. Alternative Catch/CPUE scenario combinations presented in Brodziak et al. (in press) include the following:

- Catch Scenario 1 and CPUE Scenario 1 or 2 or 3
- Catch Scenario 2 and CPUE Scenario 2 or 3
- Catch Scenario 3 and CPUE Scenario 1 or 2 or 3
- Catch Scenario 4 and CPUE Scenario 1 or 2 or 3

According to Brodziak et al. (in press) the probabilities of representing the true state of nature of the bottomfish fishery and Deep7 bottomfish population dynamics for the Catch/CPUE scenario combinations listed above range between 0.05 (Catch 4/CPUE 3) and 0.32 (Catch 2/CPUE 2). Since, the Catch 2 CPUE Scenario 1 combination has the highest probability of representing the true state of nature (0.400), none of the other scenario combinations were considered in developing alternative ACL specifications. See section 3.5 below for an overview of the 2010 stock assessment and Catch/CPUE scenarios.

3.0 Affected Environment

The species of fish harvested in the MHI bottomfish fishery are described section 3.1 below. The fishery is quite target-specific and non-target and bycatch is low. In general, fishing for bottomfish occurs in both State (0-3 nm from shore) and Federal waters (beyond 3 nm). The fishery has a generally low level of interactions with protected species including marine mammals, sea turtles, and no interactions with seabirds, which are described in Section 3.6. Section 3.8.3 provides an overview of the fishery participants, gear, harvest, and socio-economic characteristics. Impacts of the alternatives considered are discussed in section in 4.0.

3.1 Bottomfish Management Unit Species

The MHI bottomfish fishery harvests an assemblage, or complex, of 14 species that include nine snappers, four jacks (trevally) and a single species of grouper. However, the target species of the fishery, and the species of primary management concern are six deep-water snappers and the grouper. Termed the “Deep 7 bottomfish,” they include onaga (*Etelis coruscans*), ehu (*Etelis carbunculus*), gindai (*Pristipomoides zonatus*), kalekale (*Pristipomoides sieboldii*), opakapaka (*Pristipomoides filamentosus*), lehi (*Aphareus rutilans*), and hapuupuu (*Epinephelus quernus*). The Deep 7 bottomfish complex is found along high relief, deep slopes, and are fished with a vertical handline, while other species such as ulua, kahala, and taape are caught at shallower depths. Uku can also be caught by vertical handline, but are frequently fished by drifting or slowly trolling over relatively flat bottom. Table 3 lists the Hawaii bottomfish management unit species (BMUS) of the Hawaii FEP. Although taape (*Lutjanus kasmira*) is included in the Hawaii BMUS, it is an introduced species to Hawaii and is not a popular food fish, and catches and market value remains low (Parrish et al., 2000). Similarly, catches and marketability of the kahala (*Seriola dumerili*), also remains low as this species was the cause of a widespread breakout of ciguatera in Honolulu in 1979 (Ito and Uchida, 1980), and the species continues to be associated with incidences of ciguatera fish poisoning (WPFMC, 2007).

Table 3. Hawaiian Archipelago bottomfish management unit species (BMUS)

Common Name	Local Name	Scientific Name
*Silver jaw jobfish	lehi	*Aphareus rutilans*
Grey jobfish	uku	*Aprion virescens*
Giant trevally	white ulua	*Caranx ignoblis*
Black jack	black ulua	*Caranx lugubris*
*Sea bass	hapuupuu	*Epinephelus quernus*
*Red snapper	ehu	*Etelis carbunculus*
*Longtail snapper	onaga, ulaula	*Etelis coruscans*
Blue stripe snapper	taape	*Lutjanus kasmira*
Yellowtail snapper	yellowtail, kalekale	*Pristipomoides auricilla*
*Pink snapper	opakapaka	*Pristipomoides filamentosus*
*Pink Snapper	kalekale	*Pristipomoides sieboldii*
*Snapper	gindai	*Pristipomoides zonatus*
Thick lipped trevally	pig ulua, butaguchi	*Pseudocaranx dentex*
Amberjack	kahala	*Seriola dumerili*

* Indicates a Deep 7 bottomfish

Please see the Final Supplemental Environmental Impact Statement prepared in association with Amendment 14 to the Fishery Management Plan to the Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region (Bottomfish FMP) for additional biological information on Hawaii BMUS (WPRFMC 2007).

3.2 Target Species

The Deep 7 bottomfish are the primary species targeted by MHI bottomfish fishery participants. Between 1949 and 2007 the average ratio of Deep 7 bottomfish catch to the total BMUS catch in the MHI by weight (excluding taape and kahala) was 0.72 with a range between 0.580 and 0.783 (Brodziak et al., 2009, Table A3). During the first three fishing years in which the MHI Deep 7 TAC was in place, the average ratio of Deep 7 catch to total BMUS catch (Table 4) was 0.67 (Brodziak et al. in press).

Table 4. Ratio of Deep 7 bottomfish catch to total BMUS catch in the MHI reported in fishing years (2007, 2008 and 2009)

Fishing Year	Reported Catch of Deep 7 Bottomfish (1000 pounds)	Reported Catch of all BMUS* (1000 pounds)	Ratio of Deep 7 to Total BMUS
2007-2008	196.2	301.4	0.651
2008-2009	254.9	351.0	0.726
2009-2010	213.3	330.6	0.628
Average 2007 - 2009	**221.5**	**330.7**	**0.670**

Adapted from Table 5 and 6 in Brodizak et al. (in press)
*Excludes taape and kahala

There is a limited amount of quantitative information on the life history parameters of the Deep7 bottomfish, and in particular, the early life stages and juvenile characteristics are not yet well-described. Adults tend to inhabit deep waters of roughly 100-400 m depth in the MHI although some species (e.g., opakapaka) may shoal to mid-water depths to feed. The paragraphs below are drawn from WPFMC (2007) and briefly summarize information regarding the Deep 7 bottomfish species.

Onaga: Large specimens of onaga will reach at least three feet in length and weigh up to 30 pounds. They inhabit deep, rocky bottoms offshore and are known to occur between 80 and 250 fathoms (fm). Onaga are commonly caught off the bottom or in areas of steep drop-offs, ledges, and pinnacles. Onaga feed on small fishes, squids, and crustaceans, and are thought to reach sexual maturity at about 21 inches and five pounds, at approximately five years of age. Females with ripe ovaries have been reported during August and September. Onaga are distributed throughout the Indo-Pacific region.

Ehu: Adult ehu will reach a length of at least 24 inches and a weight of up to about 12 pounds. They inhabit deeper offshore water beyond the reef, mainly occurring over rocky bottoms, usually between 80 and 218 fathoms. They feed on fishes and larger invertebrates such as squids, shrimps, and crabs, and reach sexual maturity at about 11.7 inches fork length, or one pound in weight, at approximately three years of age. Ehu, or ula ula, were determined to spawn in the NWHI from July – September in a study by Everson (1984). Ehu are distributed throughout the Indo-Pacific region.

Kalekale: Large specimens of kalekale can reach up to 24 inches in length and six pounds. Commonly, they are found at around 12 inches in length. They inhabit deeper offshore water beyond the reef, occurring over rocky bottoms usually between 40 and 200 fathoms. They feed on fish, shrimps, crabs, polychaetes, cephalopods, and urochordates. Fish of 14 inches fork length are approximately two pounds in weight and five years of age. Kalekale are distributed throughout the Indo-Pacific region.

Opakapaka: Large specimens will reach a length of at least three feet and weigh up to about 20 pounds. They inhabit deeper offshore water beyond the reef, occurring over rocky bottoms, usually between 40 and 120 fathoms. Fish apparently migrate into shallower depths near 40 fathoms at night. They feed on small fishes, squids, shrimps, crabs, pyrosomes, and zooplankton. Sexual maturity is reached at about 1.8 years and they generally spawn at about 2.2 years (1.5 pounds, 13 inches fork length). Their spawning season in the NWHI was determined in a 1980 study to be from June – December with peak spawning in August (Kikkawa 1980). Previous research on the age and growth of opakapaka estimated a maximum age of 18 years (Ralston and Miyamoto, 1983). However, recent ageing research based on bomb radiocarbon and lead radium decay dating of archival otolith samples indicate that this species has a life span on the order of 40 years. (A. Andrews, PIFSC, unpublished data, in Brodziak et al., in press). This suggests that the adult natural mortality rate of opakapaka, the most abundant and key Deep 7 bottomfish species, is on the order of M=0.1 (Brodziak et al. in press).

Gindai: Gindai will reach up to 20 inches in length and six pounds in weight. They inhabit deeper offshore water beyond the reef, occurring over rocky bottoms, usually between 60 and

130 fathoms. They feed on fishes, shrimps, crabs, cephalopods, and other invertebrates. Gindai are distributed throughout the Indo-Pacific region.

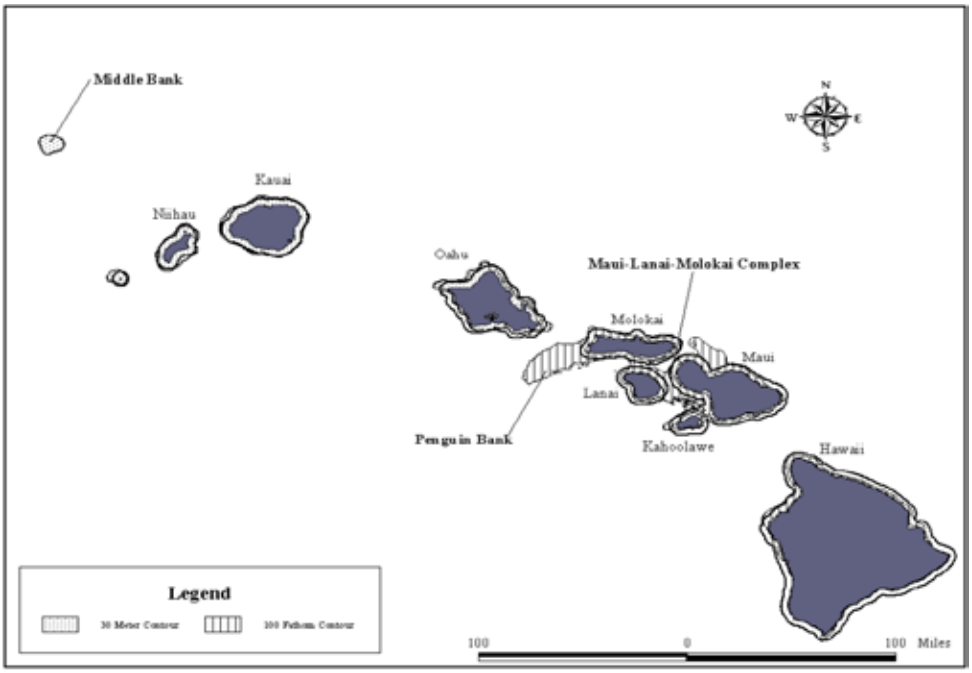
Lehi: Large lehi specimens will reach a length of at least three feet and weigh up to about 30 pounds. They inhabit reefs and rocky bottom areas usually between 60 and 100 fathoms. They feed on fish, squid, and crustaceans. Lehi are distributed throughout the Indo-Pacific region.

Hapuupuu: This grouper reaches lengths of up to four feet and weighs up to 60 pounds. They occur in waters 11 to 208 fathoms deep. They feed mainly on fish and crustaceans. The hapuupuu is endemic to the Hawaiian Islands and Johnston Island.

Stock status of target bottomfish is provided in section 3.5 below.

3.3 MHI Bottomfish Habitat

Commercially important deepwater bottomfish are found along the deep slopes of island coasts and banks at depths of 100 to 400 meters (55 to 218 fathoms). Because of the volcanic nature of the islands within the Hawaiian Islands archipelago, most bottomfish habitat occurs in steep slope areas on the margins of the islands and banks. Recent mapping of bottomfish habitat in the MHI has shown that approximately 47 percent of the bottomfish habitat lies in State waters (Parke 2007). Bottomfish fishing grounds within federal waters (3 to 200 nm offshore) around the MHI include Middle Bank, most of Penguin Bank and approximately 45 nm of 100-fathom bottomfish habitat in the Maui–Molokai–Lanai complex (see Fig. 3).



Source: WPFMC 2007

Figure 3. General location of bottomfish habitat in the main Hawaiian Islands

3.4 Bycatch

As is the case for most fisheries, some of the MHI bottomfish fishery catches are lost or discarded. Fish may be stripped off the lines by sharks (i.e., lost) or they may be deliberately discarded due to shark damage or because of concerns regarding ciguatoxins.

Bycatch (i.e. discards) information from the MHI commercial bottomfish fishery has been compiled from catch and effort data submitted to HDAR by MHI commercial bottomfish fishery participants during 2003 and 2004. Overall, fishing for Deep 7 species is fairly target-specific, and the bycatch rate is relatively low, with 8.5 percent of the catch reported as not retained either because it was either lost or deliberately discarded (Kawamoto and Gonzales 2005). Pelagic management unit species comprise less than one percent (0.9 percent) of the total catch with less than one percent (0.3 percent of total catch) of this lost or discarded. The majority (88 percent) of this pelagic bycatch consists of sharks. It is believed that discarding sharks does not result in mortality because sharks do not suffer from barotraumas when brought up from depth (WPRFMC 2007).

Very little (3.3 percent) of the targeted Deep 7 species catch is reported as bycatch, and these are mostly snappers and groupers that have been damaged by sharks. If all fish in the BMUS complex (Deep 7 and other BMUS) are considered, the BMUS bycatch percentage rises to 7.5 percent. The majority of the BMUS bycatch is composed of kahala, butaguchi, and white ulua. All of these species are members of the jack family (Carangidae) and no jacks are included in the Deep 7 species complex. Ninety-three percent of all kahala (*Seriola dumerili* and *S. rivoliana*) were reported as bycatch. Release rates of kahala are high because these fish are known to be ciguatoxic and, as a result, have little market value in Hawaii (WPRFMC 2007). In 2009, the annual reported catch of kahala was 13,711 lb, of which less than four percent was sold.

The miscellaneous species category includes over 30 species of near-shore and pelagic fishes that are occasionally caught while bottomfish fishing. Miscellaneous species comprise 4.4 percent of the overall catch and account for less than one percent (0.7 percent) of the bycatch.

Because non-commercial reporting requirements were only recently implemented, data on bycatch for the non-commercial sector of the MHI bottomfish fishery is not yet available. As compared to commercial fishery participants, non-commercial participants are believed to retain a greater variety of species for home consumption or distribution to relatives and friends, and thus their bycatch percentages are likely substantially lower than that of the commercial sector (K. Kawamoto, PIFSC, personal communication, reported in WPRFMC 2007).

The original Bottomfish FMP included five non-regulatory measures aimed at further reducing bycatch and bycatch mortality in the fishery and improving bycatch reporting: (1) outreach to fishermen and engagement of fishermen in management including research and monitoring in order to raise their awareness of bycatch issues and options to reduce bycatch and bycatch mortality, (2) research into fishing gear and method modifications to reduce bycatch and bycatch mortality, (3) research into the development of markets for discarded fish species (4) improvement of data collection and analysis systems to better measure bycatch and (5) training and outreach in methods to reduce the mortality of released fish due to barotrauma. These non-

regulatory measures of the Bottomfish FMP were adopted into the Hawaii FEP and will continue in the fishery, regardless of the ACL that is specified.

3.5 Stock Status

Originally described in Amendment 6 to the Bottomfish FMP (68 FR 46112, August 5, 2003), status determination criteria (SDC), and other reference points for Hawaii bottomfish, were incorporated into the Hawaii FEP (75 FR 2198, January 14, 2010) and is summarized here.

Under the Hawaii FEP, overfishing occurs when the fishing mortality rate (F) is greater than the fishing mortality rate, which produces MSY (F_{MSY}) for one year or more. This threshold is termed the maximum fishing mortality threshold (MFMT) and is expressed as a ratio, F/F_{MSY} = 1.0. Thus, if the F/F_{MSY} ratio is greater than 1.0 for one year or more, overfishing is occurring. A stock is considered overfished when its biomass (B) has declined below the level necessary to produce MSY on a continuing basis (B_{MSY}). This threshold is termed the minimum stock size threshold (MSST) and is expressed as a ratio, B/B_{MSY} = 0.7. Thus, if the B/B_{MSY} ratio is less than 0.7, the stock complex is considered overfished. The SDCs of MFMT and MSST are applied to individual species within the multi-species stock complex when possible. When this is not possible, they are based on indicator species for the multi-species stock complex.

For management purposes, Hawaii bottomfish are managed as a single archipelagic-wide multi-species bottomfish stock complex. However, for assessment purposes, NMFS provides stock status evaluations for the archipelagic-wide multi-species bottomfish stock complex as a whole, as well as separate evaluations for the stock complex for the MHI subarea and NWHI subarea, which include the Mau and Hoomalu Zones.

In the 2008 stock assessment update (Brodziak et al., 2009) Hawaii bottomfish were assessed as a single, archipelagic multi-species stock complex and was not overfished (B_{2007}/B_{MSY}=1.13) and was not subject to overfishing (F_{2007}/F_{MSY}=0.62). However, due to closure of the NWHI fishery, and the disproportionate fishing mortality on Deep 7 bottomfish species in the MHI, the Council recommended, and NMFS conducted status evaluation on just the Deep 7 bottomfish stock complex in the MHI for the 2010 stock assessment update. This 2010 update indicated that the MHI Deep 7 bottomfish stock complex was not depleted (B_{2010}/B_{MSY}=0.92), and is currently not experiencing overfishing (F_{2010}/F_{MSY}=0.58) (Brodziak et al., in press). While, the 2010 did not provide a stock status evaluation of the archipelagic bottomfish stock multi-species stock complex, the F and B reference points are expected to be significantly better than the 2008 estimates given the termination of the NWHI fishery.

Overview of the 2010 Stock Assessment

The 2010 stock assessment update for the MHI Deep 7 bottomfish stock complex was conducted by PIFSC through fishing year 2010 and included projections to determine catch limits and their associated probabilities of overfishing (Brodziak et al., in press). The 2010 stock assessment uses similar commercial fishery data as in the 2008 assessment update (Brodziak et al. 2009), but includes a modified treatment of unreported catch and catch per unit effort (CPUE) standardization as well as new research information on the likely life history characteristics of bottomfish (A. Andrews, PIFSC, unpublished 2010 research) in response to recommendations from the Western Pacific Stock Assessment Review (WPSAR) of the 2008 update (Stokes,

2009). Additionally, while the 2008 assessment considered the entire assemblage of Hawaii bottomfish, the 2010 assessment focused entirely on the Deep 7 stock complex.

To address the unreported catch issue, the 2010 assessment includes four scenarios of unreported catch developed from available information, which are described in detail in (Brodziak et al., in press). The four scenarios are labeled in order of magnitude from the highest (Scenario 1) to the lowest (Scenario 4) estimates of unreported catch.

- **Catch Scenario 1:** Unreported catch is 2 times commercial reported catch
- **Catch Scenario 2:** Unreported catch equals the commercial reported catch
- **Catch Scenario 3:** Unreported catch is one-fifth the commercial reported catch
- **Catch Scenario 4:** There is no unreported catch

According to the 2010 assessment the Catch Scenario 2 is the baseline because it uses the best available information on unreported to reported catch ratios estimated for individual Deep7 bottomfish species.

To address CPUE issue, the 2010 assessment includes three scenarios to represent changes in fishing power of the fleet that targets Deep 7 bottomfish for commercial catch.

- **CPUE Scenario 1:** Negligible change in bottomfish fishing power through time.
- **CPUE Scenario 2:** Moderate change in bottomfish fishing power through time. Specifically, this scenario assumed that: (i) there was no change in fishing power during 1949-1970; (ii) fishing power increased at a rate of 0.25 percent per year during 1971-1980; fishing power increased at a rate of 0.5 percent per year during 1981-1990; (iii) fishing power increased at a rate of 0.25 percent per year during 1991-2000; and (iv) fishing power did not change during 2001-2010.
- **CPUE Scenario 3:** Substantial change bottomfish fishing power through time. Specifically, this scenario assumed that a substantial change in fishing power scenario had occurred since the 1950s with an average increase in fishing power of roughly 1.2 percent per year.

According the 2010 assessment CPUE Scenario I was the baseline assessment because it best represented the scientific information about the efficiency of the Deep7 bottomfish fishing fleet through time and also because it did not include ad hoc assumptions about changes in fishing power for the deep handline fishery that has traditionally harvested the Deep7 bottomfish complex in the MHI. Based on the Catch 2/CPUE 1 scenario combination, the maximum sustainable yield (MSY) of the MHI Deep 7 bottomfish stock complex is estimated to be 417,000 lb. The 2010 stock assessment also included projection results of a range of commercial catches of Deep 7 bottomfish that would produce probabilities of overfishing in fishing year 2011-12 ranging from 0 percent to 100 percent and at five percent intervals (Brodziak et al., in press, Table 17.1). Under the Catch 2/CPUE 1 scenario combination, the catch limit associated with a 50 percent probability of overfishing is 383,000 lb of MHI Deep 7 bottomfish. Therefore, while the long-term MSY for the fishery is 417,000 lb, the OFL for the 2011-12 and 2012-13 fishing years is estimated to be 383,000 lb.

3.6 Protected Species

Protected species generally include sea turtles, marine mammals and seabirds. Please see the Final Supplemental Environmental Impact Statement prepared in association with Amendment 14 to the Bottomfish FMP for biological information on these species (WPRFMC 2007). Additional information is available in a 2008 Biological Opinion prepared by NMFS under section 7 of the ESA (NMFS 2008).

Marine Mammals

Cetaceans listed as endangered under the ESA and observed in the Hawaiian Archipelago are the humpback whale (*Megaptera novaeangliae*), sperm whale (*Physeter macrocephalus*), blue whale (*Balaenoptera musculus*), fin whale (*B. physalus*), and sei whale (*B. borealis*). Although uncommon, the northern elephant seal (*Mirounga angustirostris*) has been occasionally observed in Hawaiian waters. The Hawaiian monk seal is the only endemic pinniped in Hawaii and is listed as endangered under the ESA. Research on monk seal diets suggests that some deepwater bottomfish caught in the fishery may be food resources for monk seals (unpublished report, NMFS PIFSC, Honolulu). However, under current levels of fishing pressure in the MHI, the monk seal population is growing, pupping is increasing, and the pups appear to be foraging successfully. Considering that monk seal foraging success appears to be higher in the MHI than in the NWHI despite higher fishing pressure in the MHI, competition for forage with the MHI bottomfish fishery does not appear to adversely impact monk seals in the MHI at this time. The 2008 Biological Opinion on the MHI Bottomfish fishery included an effects exposure response-risk analysis for monk seal hooking, behavioral modification, and prey reduction as a result of the MHI bottomfish fishery (NMFS 2008). The Biological Opinion documented that the Hawaii's bottomfish fishery (in both the MHI and the NWHI management areas) may incidentally interact with monk seals. Although no hooking have been reported from the MHI bottomfish fishery, it is possible that hookings may have occurred without being observed and/or recorded. NMFS estimated that one seal would be hooked every 6.5 years, and that one serious injury/mortality would result from a hooking every 67 years. The Biological Opinion concluded that the Hawaii bottomfish fishery may affect, but is not likely to adversely affect the Hawaiian monk seal and that the fishery would not jeopardize the continued existence of the Hawaiian monk seal or destroy or adversely modify its critical habitat.

NMFS is currently proposing to designate areas in the main Hawaiian Islands as monk seal critical habitat. Specific areas proposed include terrestrial and marine habitats from 5 m inland from the shoreline extending seaward to the 500 m depth contour around Kaula Island, Niihau, Kauai, Oahu, Maui Nui (including Kahoolawe, Lanai, Maui and Molokai) and Hawaii Island (76 FR 32026, June 2, 1011). At this point in time there is insufficient information to determine the proposed designation's potential impacts on the MHI Deep 7 bottomfish fisheries (ECONorthwest, 2011). If the proposal is finalized, NMFS would re-initiate consultation under Section 7 of the ESA to determine the impact of fishing activities on critical habitat and any necessary management measures. Other species of marine mammals that are not listed under the ESA that occur in the area where the MHI bottomfish fishery operates are:

Whales:

- Blainsville beaked whale (*Mesoplodon densirostris*)

- Bryde's whale (*Balaenoptera edeni*)
- Cuvier's beaked whale (*Ziphius cavirostris*)
- Dwarf sperm whale (*Kogia simus*)
- False killer whale (*Pseudorca crassidens*)
- Killer whale (*Orcinus orca*)
- Longman's beaked whale (*Indopacetus pacificus*)
- Melon-headed whale (*Peponocephala electra*)
- Minke whale (*Balaenoptera acutorostrata*)
- Pygmy killer whale (*Feresa attenuata*)
- Pygmy sperm whale (*Kogia breviceps*)
- Short-finned pilot whale (*Globicephala macrorhynchus*)

Dolphins:

- Bottlenose dolphin (*Tursiops truncatus*)
- Dall's porpoise (*Phocoenoides dalli*)
- Fraser's dolphin (*Lagenodelphis hosei*)
- Risso's dolphin (*Grampus griseus*)
- Rough-toothed dolphin (*Steno bredanensis*)
- Spinner dolphin (*Stenella longirostris*)
- Spotted dolphin (*Stenella attenuata*)
- Striped dolphin (*Stenella coeruleoalba*)

On November 17, 2010, NMFS published a proposed rule to list the Hawaiian insular false killer whale as an endangered species under the ESA (75 FR 70169). If the proposal is finalized, NMFS would re-initiate consultation under Section 7 of the ESA to determine the impact of bottomfish fishing activities on the population, and any necessary management measures.

The MHI bottomfish fishery is listed as a Category III fishery under Section 118 of the MMPA (75 FR 68468, November 8, 2010; 76 FR 28, 2011). A Category III fishery is one with a low likelihood or no known incidental takings of marine mammals. NMFS has also concluded that the Hawaii Archipelago commercial bottomfish fisheries as currently conducted will not affect marine mammals in any manner not considered or authorized under the Marine Mammal Protection Act.

Sea Turtles

The breeding populations of Mexico's olive ridley sea turtles (*Lepidochelys olivacea*) are currently listed as endangered, while all other ridley populations are listed as threatened. Leatherback sea turtles (*Dermochelys coriacea*) and hawksbill turtles (*Eretmochelys imbricata*) are also classified as endangered. Loggerhead (*Caretta caretta*) and green sea turtles (*Chelonia mydas*) are listed as threatened (the green sea turtle is listed as threatened throughout its Pacific range, except for the endangered population nesting on the Pacific coast of Mexico). These five species of sea turtles are highly migratory, or have a highly migratory phase in their life history. The green turtle is the only species regularly seen in EEZ waters around Hawaii. In its 2008 Biological Opinion on the MHI bottomfish fishery, NMFS determined that although sea turtles may be found within the MHI area and could interact with the fishery, there have been no reported or observed interactions with sea turtles in the history of the bottomfish fishery.

Hawksbill, leatherback and olive ridley turtles are likely to be rare in the action area. NMFS concluded that the bottomfish fishery is not likely to adversely affect hawksbill, leatherback, loggerhead or olive ridley turtles. The opinion noted that mortalities of green turtles sometimes occur from collisions with vessels around the MHI, and this is likely responsible for up to two green sea turtle mortalities per year. The resulting mortality is not likely to jeopardize the species because green sea turtles have been rapidly increasing in numbers in recent years when bottomfish fishing was occurring at a higher level of effort [than the current fishery], and they are extremely unlikely to be hooked or entangled by bottomfish fishing gear (NMFS 2008).

Seabirds

Seabirds listed as threatened or endangered under the ESA are managed by the USFWS. The short-tailed albatross, which is listed as endangered under the ESA, is a migratory seabird that is known to be occasionally present in the NWHI. No interactions between seabirds and the MHI bottomfish fishery have been observed or reported. Other listed seabirds found in the region are the endangered Hawaiian petrel (*Pterodroma phaeopygia)* and the threatened Newell's shearwater (*Puffinus auricularis newelli*). Non-listed seabirds known to be present are the blackfooted albatrosses (*Phoebastria nigripes*); Laysan albatross (*P. immutabilis*); wedge-tailed (*Puffinus pacificus*), sooty (*P. griseus*) and fleshfooted (*P. carneipes*) shearwaters, as well as the masked booby (*Sula dactylatra*), brown booby (*Sula leucogaster*), and red-footed booby *(Sula sula*). Most of these seabirds forage far from the islands and are unlikely to interact with the bottomfish fishery. In addition, bottomfish fishing gear is deployed close to the vessel and does not afford much opportunity for seabirds to attack the bait. When bottomfish fishing, a weighted mainline is deployed vertically over the side of the vessel and it sinks rapidly beyond the range of a diving seabird. It is retrieved rapidly with electric or hydraulic pullers. The time that bait is within the range of a diving seabird is limited, and the proximity of the vessel hull is a significant deterrent.

Protected Species Interactions

Currently, there is no observer coverage in the MHI bottomfish fishery; therefore, there is very little information available on interactions between the MHI bottomfish fishery and protected species. As noted earlier, the MHI bottomfish fishery may interact indirectly with Hawaiian monk seals, though no mortality or serious injuries have been attributed to the fishery (Caretta et al., 2010). Nitta and Henderson (1993) reported that bottlenose dolphins remove bait and catch from handlines used to catch bottomfish off the island of Hawaii and Kaula Island, but no information is available that suggests any mortality or serious injuries have ever occurred and no interactions with dolphins have been reported by commercial bottomfish participants in recent years. NMFS 2008 Biological Opinion on Hawaii's bottomfish fishery noted that mortalities of green turtles sometimes occur from collisions with vessels around the MHI, and this is likely responsible for up to two green sea turtle mortalities per year. Although there is a possibility of accidental hooking of seabirds, the circle hooks used in the bottomfish fishery do not lend easily to incidental hooking of seabirds and interactions between seabirds and the MHI bottomfish fishery have not been observed or reported.

3.7 Essential Fish Habitat and Habitat Areas of Particular Concern

Essential fish habitat (EFH) is defined as those waters and substrate as necessary to fish for spawning, breeding, feeding, and growth to maturity. This includes the marine areas and their

chemical and biological properties that are utilized by the organism. Substrate includes sediment, hard bottom, and other structural relief underlying the water column along with their associated biological communities. In 1999, the Council developed and NMFS approved EFH definitions for management unit species (MUS) of the Bottomfish and Seamount Groundfish FMP (Amendment 6), Crustacean FMP (Amendment 10), Pelagic FMP (Amendment 8), and Precious Corals FMP (Amendment 4) (74 FR 19067, April 19, 1999). NMFS approved additional EFH definitions for coral reef ecosystem species in 2004 as part of the implementation of the Coral Reef Ecosystem FMP 2004 (69 FR8336, February 24, 2004). EFH definitions were also approved for deepwater shrimp through an amendment to the Crustaceans FMP in 2008 (73 FR 70603, November 21, 2008). Ten years later in 2009, the Council developed and NMFS approved five new archipelagic-based fishery ecosystem plans (FEP), including the Hawaii Archipelago FEP. The FEP incorporated and reorganized elements of the Councils' species-based FMPs into a spatially-oriented management plan (75 FR 2198, January 14, 2010). As a result, EFH definitions and related provisions for all FMP fishery resources are subsequently carried forward into the respective FEPs.

In addition to and as a subset of EFH, the Council described habitat areas of particular concern (HAPC) based on the following criteria: ecological function of the habitat is important, habitat is sensitive to anthropogenic degradation, development activities are or will stress the habitat, and/or the habitat type is rare. In considering the potential impacts of a proposed fishery management action on EFH, all designated EFH must be considered. The designated areas of EFH and HAPC for all Hawaii FEP MUS by life stage are summarized in Table 5. The Council is currently reviewing habitat information relevant to Hawaii bottomfish and seamount groundfish and may refine these EFH/HAPC designations if warranted (76 FR 13604, March 14, 2011).

Table 5. EFH and HAPC for Hawaii FEP MUS

MUS	Species Complex	EFH	HAPC
Bottomfish MUS	**Shallow-water species (0–50 fm):** uku (*Aprion virescens*), thicklip trevally (*Pseudocaranx dentex*), giant trevally (*Caranx ignoblis*), black trevally (*Caranx lugubris*), amberjack (*Seriola dumerili*), taape (*Lutjanus kasmira*)	**Eggs and larvae:** the water column extending from the shoreline to the outer limit of the EEZ down to a depth of 400 m (200 fm). **Juvenile/adults:** the water column and all bottom habitat extending from the shoreline to a depth of 400 m (200 fm)	All slopes and escarpments between 40–280 m (20 and 140 fm) Three known areas of juvenile opakapaka habitat: two off Oahu and one off Molokai

MUS	Species Complex	EFH	HAPC
Bottomfish MUS	**Deep-water species (50–200 fm):** ehu (*Etelis carbunculus*), onaga (*Etelis coruscans*), opakapaka (*Pristipomoides filamentosus*), yellowtail kalekale (*P. auricilla*), kalekale (*P. sieboldii*), gindai (*P. zonatus*), hapuupuu (*Epinephelus quernus*), lehi (*Aphareus rutilans*)	**Eggs and larvae:** the water column extending from the shoreline to the outer limit of the EEZ down to a depth of 400 m (200 fathoms) **Juvenile/adults:** the water column and all bottom habitat extending from the shoreline to a depth of 400 meters (200 fm)	All slopes and escarpments between 40–280 m (20 and 140 fm) Three known areas of juvenile opakapaka habitat: two off Oahu and one off Molokai
Seamount Groundfish MUS	**Seamount groundfish species (50–200 fm):** armorhead (*Pseudopentaceros wheeleri*), raftfish/butterfish (*Hyperoglyphe japonica*), alfonsin (*Beryx splendens*)	**Eggs and larvae:** the (epipelagic zone) water column down to a depth of 200 m (100 fm) of all EEZ waters bounded by latitude 29°–35° **Juvenile/adults:** all EEZ waters and bottom habitat bounded by latitude 29°–35° N and longitude 171° E–179° W between 200 and 600 m (100 and 300 fm)	No HAPC designated for seamount groundfish
Crustaceans MUS	**Spiny and slipper lobster complex:** Hawaiian spiny lobster (*Panulirus marginatus*), spiny lobster (*P. penicillatus, P.* spp.), ridgeback slipper lobster (*Scyllarides haanii*), Chinese slipper lobster (*Parribacus antarcticus*) **Kona crab :** Kona crab (*Ranina ranina*)	**Eggs and larvae:** the water column from the shoreline to the outer limit of the EEZ down to a depth of 150 m (75 fm) **Juvenile/adults:** all of the bottom habitat from the shoreline to a depth of 100 m (50 fm)	All banks in the NWHI with summits less than or equal to 30 m (15 fathoms) from the surface
	Deepwater shrimp: (*Heterocarpus* spp.)	**Eggs and larvae:** the water column and associated outer reef slopes between 550 and 700 m **Juvenile/adults:** the outer reef slopes at depths between 300-700 m	No HAPC designated for deepwater shrimp.

MUS	Species Complex	EFH	HAPC
Precious Corals MUS	**Shallow-water precious corals (10-50 fm):** black coral (*Antipathes dichotoma*), black coral (*Antipathis grandis*), black coral (*Antipathes ulex*) **Deep-water precious corals (150–750 fm):** Pink coral (*Corallium secundum*), red coral (*C. regale*), pink coral (*C. laauense*), midway deepsea coral (*C.* sp nov.), gold coral (*Gerardia* spp.), gold coral (*Callogorgia gilberti*), gold coral (*Narella* spp.), gold coral (*Calyptrophora* spp.), bamboo coral (*Lepidisis olapa*), bamboo coral (*Acanella* spp.)	EFH for Precious Corals is confined to six known precious coral beds located off Keahole Point, Makapuu, Kaena Point, Wespac bed, Brooks Bank, and 180 Fathom Bank EFH has also been designated for three beds known for black corals in the Main Hawaiian Islands between Milolii and South Point on the Big Island, the Auau Channel, and the southern border of Kauai	Includes the Makapuu bed, Wespac bed, Brooks Banks bed For Black Corals, the Auau Channel has been identified as a HAPC
Coral Reef Ecosystem MUS	**All Coral Reef Ecosystem MUS**	EFH for the Coral Reef Ecosystem MUS includes the water column and all benthic substrate to a depth of 50 fm from the shoreline to the outer limit of the EEZ	Includes all no-take MPAs identified in the CRE-FMP, all Pacific remote islands, as well as numerous existing MPAs, research sites, and coral reef habitats throughout the western Pacific

Weighted lines or baited hooks may rest on the bottom substrate during bottomfish fishing operations, and may impact substrate EFH and HAPC. Lost bottomfish fishing gear, including anchors and anchors lines, have the potential to impact the substrate. Research conducted in NWHI bottomfish fishing sites found low counts of this type of fishing debris (Raita and St. Rogatien Banks) (Kelley and Moffitt 2004). HDAR creel censuses have not identified gear loss in the MHI BF fishery. Comparable research has not been conducted on the MHI bottomfish fishing sites, but because gear loss is not considered by fishery managers to be a large problem in the bottomfish fishery, such research would be expected to yield similar findings.

No adverse effects to water column EFH and HAPC have been attributed to bottomfish fishing in Hawaii (G. Davis, PIRO, personal communication). Some have theorized that sending a weighted handline with baited hooks and a small chum bag to bottom depths, generally to 50 fathoms and below, may introduce parasites or disease into the water column, but to date no such problems have been reported or documented in Hawaii's bottomfish fisheries (Kelley and Moffitt 2004). The use of explosives, poisons, trawl nets, and other destructive gears that may adversely affect EFH and HAPC is prohibited under the Hawaiian Archipelago FEP.

3.8 Economic, Social and Cultural Setting

3.8.1 The Economic Setting

Hawaii's economy is dominated by the visitor industry (tourism) and defense (military), with tourism being the leading industry in terms of employment and expenditures. The two represent over one quarter of the state's 2008 Gross Domestic Product (GDP, formerly, Gross State Product) without consideration of ancillary services, and also comprise the largest shares of "export" earnings (Table 6 and Table 7). However, including retirement and disability payments, grants, contracts, other payments, and wages and salaries, total federal expenditures in Hawaii were $15 billion in 2008 (DBEDT 2010), about 24 percent of the State's GDP.

Table 6. Hawaii's gross domestic product

Year	Gross Domestic Product *(million $)*	Per Capita GDP	Residential Population
2009	NA	NA	1,295,178
2008	$63,874	$49,563	1,288,198
2007	$62,019	$48,553	1,277,356

Source: DBEDT 2010 (Table 13.02)

Table 7. Hawaii's direct income from major export industries

Year	Sugar *(million $)*	Pineapple *(million $)*	Defense *(million $)*	Visitor *(million $)*
2009	NA	NA	NA	9,993.2
2008	71.4	NA	6,1072.2	11,398.5
2007	76.3	NA	5,466.7	12,811.1
2006	79.7	NA	5,379.2	12,491.6
2005[1]	92.5	113.4	5,015.3	11,904.0

[1] 2005 is the most recent year in which complete industry statistics are available.
Source: DBEDT 2010 (Table 13.01)

Natural resource production, which includes agriculture, forestry, fishing and hunting remains important in Hawaii, although its relative contribution to the economy has been greatly reduced compared to the period of sugar and pineapple plantations throughout the first 60 or 70 years of the 20th century. In 2008, natural resource production accounted for $332 million dollars of the state's GDP, and less than one percent of the state's civilian labor force (Table 8). By comparison, 30 percent of those employed in 2008 were in management, professional, and related industries, followed by 26 percent in sales jobs, and 24 percent in the service (hospitality) industry with the remainder in construction, transportation and other industries (DBEDT, 2010). In 2008, Hawaii's civilian labor force was estimated at 646,000 individuals with approximately 4 percent unemployment rate, growing to 6.8 percent in 2009.

Table 8. Hawaii employment statistics

Year	Civilian Labor Force	Employed	Unemployment Rate	Personal Income
2009	637,000	594,500	6.8	$54,409

2008	646,000	620,000	4.0	$54,175
2007	640,150	623,150	2.7	$52,253

In 2008, there were 6.7 million visitors to in Hawaii, up 4.4 percent compared to 2009 (6.4 million) but down 10 percent compared to the peak of 7.5 million in 2007. Approximately seventy-three percent of visitors to Hawaii are domestic, while 27 percent are from international origin. (DBEDT, 2011). Please see the Final Supplemental Impact Statement prepared in association with Amendment 14 to the Bottomfish FMP for additional information on Hawaii's economy (WPRFMC 2007).

3.8.2 Overview of Hawaii Fishing-Related Economic Activities

In 2008, there were 4,263 licensed commercial fishermen in Hawaii (Hamm et al., 2010), although for many of these fishing is not the primary source of income. Many recreational and subsistence fishermen hold commercial licenses in order to be able to sell the occasional fish to cover trip expenses. In 2008 Hawaii fishermen landed over 30 million pounds of seafood (83 percent of which was comprised of pelagic tunas and billfish) with a total ex-vessel value of over $85 million (Hamm et. al., 2010). This amounts to a very small percentage of the state's $63.8 billion GDP. On the other hand, the seafood industry is an important component of the local and tourism consumption, and the recreational and subsistence proportion involves a substantial portion of the local population estimated by USFWS (1996) to be 132,000 participants. Total fishing expenditures by these participants was estimated at $130 million.

3.8.3 Overview of the MHI Bottomfish Fishery

Participation and Effort

The number of fishermen engaged in commercial bottomfish fishing in the MHI increased dramatically in the 1970s peaking in 1980s with over 500 active vessels annually. However, participation in the fishery then declined in the early 1990s, rebounded somewhat in the late 1990s, but in 2003 reached its lowest level since 1977, with 325 vessels (WPFMC, 2007). The decline in vessels and fishing effort during this period may have been due to the long-term decrease in catch rates in the bottomfish fishery and a shift of fishing effort towards tuna and other pelagic species. However, since a catch limit system was implemented in the 2007-08 fishing year, participation in the commercial fishery sector (measured by the number of vessels reporting catch of MHI Deep 7 bottomfish) has fluctuated but appears to be gradually increasing. In that fishing year, 351 vessels were actively engaged in the fishery, increasing to 468 vessels in fishing year 2008-09. Fishing year 2009-10 saw a slight decline to 451 vessels but rebounded again to 475 vessels in the 2010-11 fishing year.

During the 2010-11 fishing year, commercial participants made approximately 3,331 Deep 7 bottomfish trips compared to 2,794 trips in 2009-10, 3,275 trips in 2008-09 and 2,345 trips in the 2008-09 fishing year. Assuming participation and fishing effort is equal throughout the fleet, each vessel would have made approximately 7 trips per year catching between 75 and 85 pounds of Deep 7 bottomfish per trip. Table 9 summarizes various characteristics of the commercial sector of the MHI Deep 7 bottomfish fishery for fishing years 2007-09 to 2010-11.

Table 9. Characteristics of the MHI Deep 7 bottomfish commercial fishing sector (2007-2010)

Fishing Year	No. Vessels	No. Trips	Ave. Trips per vessel	Actual Catch (lb)	Ave. Catch per vessel (lb)	Ave. Catch per trip (lb)
2007-08	351	2,345	6.6	196,147	558.8	84.7
2008-09	468	3,275	6.9	259,194	553.8	80.3
2009-10	451	2,794	6.1	208,412	462.1	75.8
2010-11	475	3,331	7.0	268,089	564.3	80.6

Source: HDAR, unpublished data

Participation in the MHI Deep 7 bottomfish fishery by non-commercial vessels is largely unknown. However, the State of Hawaii deep bottomfish vessel registration program has been used to provide some estimates. The program requires any person who may fish for MHI Deep 7 bottomfish to register their vessel with HDAR and display the letters "BF" on their boat. This rule applies to all vessels, whether the owner is a commercial or a non-commercial fisherman (WPFMC, 2007). Based on this database and responses from a 2005 HDAR survey of all registered vessel owners, the Council estimates that approximately 1,972 non-commercial vessels are registered to participate in the MHI Deep 7 fishery; however only up to 750 may be actively fishing (WPFMC 2007).

When the federal non-commercial bottomfish permit was implemented in 2008, NMFS issued nearly 100 permits. As of 2011, only 17 individuals possess federal non-commercial MHI Deep 7 bottomfish permits. Since non-commercial fishermen are subject to a five fish per trip bag limit, the subsequent decrease in federal non-commercial permits from nearly a 100 to 17 is likely attributed to fishermen electing to obtain a state CML, which is comparable in cost to the federal permit, but does not subject them to the 5 fish per trip bag limit. This development may explain the rise in commercial vessel participation and corresponding decline in federal non-commercial permits in recent years. Ongoing cost-earning surveys conducted by PIFSC indicated that approximately 25 percent of CML holders do not sell bottomfish (J. Hospital, pers. comm., June 21, 2011) indicating that they are actually non-commercial, giving some credence to this theory. Since a non-commercial fishing permit is not required to fish in state waters, the true level of participation by the non-commercial sector in this fishery remains unquantifiable. However, the recent revision to Hawaii Revised Statutes (HAR 13-94-9, effective October 18, 2010), which requires an annual bottomfish vessel registration renewal may allow the state to identify fishing vessels that are registered to a CML holder from those that do not have a CML (i.e., non-commercial).

In 2010, NOAA's PIFSC conducted the Hawaii Bottomfish Survey to estimate important economic contributions bottomfish fishing activities provide to the State of Hawaii. Surveys were mailed to all federal non-commercial bottomfish permit holders and all Hawaii CML holders who report catching bottomfish, including Deep 7 bottomfish since November 2008. Of the 519 total survey respondents, approximately 83 percent reported catching less than 500 lb of Deep 7 bottomfish in the past 12 months while 17 percent caught more. Of those that caught less than 500 lb, 35 percent reported selling a portion of the catch compared to 79 percent of those who reported catching more than 500 lb (Hospital, 2010). Only 10 percent of survey respondents reported catching more than 1000 lb in the past 12 months. Survey respondents also reported making an average of 14 trips in the past 12 months, with Maui County residents making the

most (20), followed by Hawaii County (15), and Kauai and Honolulu (Oahu) counties with the least (12).

The majority of participants in the MHI bottomfish fishery are able to and do shift their fishing to target different bottomfish species at different times and shift from the bottomfish fishery to other fisheries, primarily the pelagic fishery, in response to seasonal fish abundance or fluctuations in price. Typically, seasonal runs of yellowfin tuna begin in late-May or June and many bottomfish fishermen take advantage of their availability.

Fishing Location

Specific bottomfish fishing locales favored by fishermen vary seasonally according to sea conditions and the availability and price of target species. Analysis of reported commercial catches of MHI Deep 7 bottom for fishing years 1949-2009 indicate that the island group of Maui, Molokai (including Penguin bank) and Lanai account for 59 percent of the catch, followed by Hawaii Island (21 percent), Oahu (8 percent) and Kauai (11 percent) (Brodziak et al., in press). During the first three fishing years in which the MHI Deep 7 TAC was in place (2007-2009), distribution of catch was similarly distributed with the Maui-Molokai-Lanai island group accounting for 56 percent of the total reported commercial catch, followed by Hawaii Island (29 percent), Oahu (7 percent) and Kauai (7 percent) (Table 10).

Table 10. Reported commercial catches (thousands of pounds) of Deep 7 bottomfish by Hawaiian Island group (fishing years 2007-08, 2008-09 and 2009-10)

Fishing Year	Hawaii Island	Maui-Molokai-Lanai	Oahu	Kauai	Total MHI Catch
2007-08	55.7	103.0	23.1	14.4	196.2
2008-09	85.5	138.8	15.7	14.9	254.9
2009-10	48.3	133.1	14.3	17.6	213.3
2007-2009 Total	189.5	374.9	53.1	46.9	664.4

Source: Adapted from Table 7.1 in Brodziak et al. (in press)

Catch

Reported commercial catch of MHI Deep7 bottomfish from 1990 to 2010 are described in Brodziak, et al., (in press) and reported below in Table 11. Note: The “FishingYear” in Table 11 corresponds to the latter half of the fishing year used by HDAR (2010) in Table 12. For example, the “2009 Year” in Table 11 corresponds to the 2008-09 fishing year in Table 12. Additionally, reported catches may differ slightly between Table 11 and Table 12 as more data was collected and errors were corrected for in the latter.

Table 11. Reported commercial catches of MHI Deep 7 bottomfish (fishing year 1990-2010)

Fishing Year	Catch (lb)	Fishing Year	Catch (lb)	Fishing Year	Catch (lb)
1990	456,900	1997	299,700	2004	206,100
1991	325,300	1998	296,800	2005	243900
1992	362,500	1999	214,800	2006	190,000
1993	260,400	2000	309,700	2007	221,800
1994	309,300	2001	260,400	2008	196,200

1995	359,100	2002	215,600	2009	254,900
1996	288,800	2003	244,500	2010	213,300

Source: Brodziak et al. (in press)

Since the 2007-08 fishing year, the MHI Deep 7 bottomfish fishery has been managed under a fleet-wide TAC specified each fishing year by NMFS as recommended by the Council. Table 12 summarizes the MHI Deep 7 bottomfish TAC limits, fishery closure dates and actual catches for the 2007-08 through the 2010-11 fishing years.

Table 12. MHI Deep 7 TAC limits, fishery closure dates and actual catch 2007-2010

Fishing Year	Specified TAC Limit (lb)	Date Fishery Closed	Actual Catch Total (lb)	Overage (+)/ Underage (-) in lb
2007-2008	178,000 lb	Apr. 16, 2008	196,147	+18,147 lb (10.2%)
2008-2009	241,000 lb	Jul. 6, 2009	259,194	+18,194 lb (7.5%)
2009-2010	254,050 lb	Apr. 20, 2010	208,412	-45,638 lb (-17.9%)
2010-2011	254,050 lb	Mar. 12, 2011	268,089	+14,039lb (5.5%)

Source: HDAR 2010 (fishing year 2007-10); HDAR unpublished data (fishing year 2010-11)

Accurate catch data from the non-commercial Deep 7 bottomfish sector is currently unavailable. Although non-commercial catch and effort reporting is required when bottomfish fishing in federal waters, there is no complementary requirement for fishing state waters. Courtney and Brodziak (2011) conducted a review of unreported to reported catch ratios for bottomfish resources in the MHI using published information on estimates of unreported catch. These ratios were then used to develop estimates of unreported bottomfish catch considered in the PIFSC 2010 stock assessment sensitivity analyses. Based on this literature review, unreported catch, which includes non-commercial catch, is estimated to be equal to the commercial reported catch (Brodziak, et al., in press). Table 13 summarizes monthly and cumulative reported catches of MHI Deep 7 bottomfish in fishing year 2005-06 through 2010-11.

Table 13. MHI Deep 7 bottomfish - monthly and cumulative lb caught (Sept. 2005-March 2011)

Monthly Lb Caught Sept. 2005-March 2011						
Month	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
Sep	6,841.1	12,986.3	29.0	0.0	20,718.0	46,872.0
Oct	8,937.8	31,295.4	26,059.0	0.0	39,943.0	34,757.4
Nov	26,341.8	28,536.7	32,003.3	28,672.1	8,416.5	35,424.1
Dec	58,210.8	29,777.8	23,331.0	58,764.6	66,854.1	67,325.0
Jan	15,592.7	24,195.2	32,880.5	49,570.6	33,273.1	37,336.5
Feb	24,671.6	18,815.5	49,362.1	18,045.1	26,829.0	41,675.4
Mar	13,709.2	31,797.2	28,511.7	24,449.9	8,255.4	4,650.7
Apr*	3,817.7	22,417.0	3,999.4	28,959.4	4,754.2	0.0
May*	9,840.2	5,030.9	0.0	35,616.0	0.0	0.0
Jun*	8,141.8	0.0	0.0	10,840.2	0.0	0.0
Jul*	7,128.9	0.0	2.5	4,283.8	0.0	0.0
Aug*	9,769.6	0.0	0.0	0.0	0.0	0.0

Totals	193,003.2	204,852.0	196,178.5	259,201.7	209,043.3	268,041.1
Cumulative Lb Caught Sept. 2005-March 2011						
Month	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
Sep	6,841.1	12,986.3	29.0	0.0	20,718.0	46,872.0
Oct	15,778.9	44,281.7	26,088.0	0.0	60,661.0	81,629.4
Nov	42,120.7	72,818.4	58,091.3	28,672.1	69,077.5	117,053.5
Dec	100,331.5	102,596.2	81,422.3	87,436.7	135,931.6	184,378.5
Jan	115,924.2	126,791.4	114,302.8	137,007.3	169,204.7	221,715.0
Feb	140,595.8	145,606.9	163,664.9	155,052.4	196,033.7	263,390.4
Mar	154,305.0	177,404.1	192,176.6	179,502.3	204,289.1	268,041.1
Apr*	158,122.7	199,821.1	196,176.0	208,461.7	209,043.3	0.0
May*	167,962.9	204,852.0	196,176.0	244,077.7	0.0	0.0
Jun*	176,104.7	0.0	196,176.0	254,917.9	0.0	0.0
Jul*	183,233.6	0.0	196,178.5	259,201.7	0.0	0.0
Aug*	193,003.2	0.0	0.0	259,203.7	0.0	0.0

Source: Hawaii Division of Aquatic Resources, Data available through 5/16/2011
* Denotes months with closed season

Table 14 summarizes reported monthly mean and maximum catches of MHI Deep 7 bottomfish in fishing year 2005-06 through 2010-11 as provided by the Hawaii Division of Aquatic Resources.

Table 14. MHI Deep 7 Bottomfish - monthly mean and max lb caught (Sept. 2005-March 2011)

Hawaii Deep 7 Bottomfish - Monthly Pounds (lb) Caught Sep 2005-March 2011		
Month	*Mean lb Caught **	*Max lb Caught (Fishing Year Caught)*
Sep	17,489.28	46,872.0 (2010-11)
Oct	28,198.52	39,943.0 (2009-10)
Nov	26,565.75	35,424.1 (2010-11)
Dec	50,710.55	67,325.0 (2010-11)
Jan	32,141.43	49,570.6 (2008-09)
Feb	29,899.78	49,362.1 (2007-08)
Mar	18,562.35	31,797.2 (2006-07)
Apr	12,789.54	28,959.4 (2008-09)
May	16,829.03	35,616.0 (2008-09)
Jun	9,491.00	10,840.2 (2008-09)
Jul	9,270.80	7,128.9 (2005-06)
Aug	9,769.60	9,769.6 (2005-06)

** Months with zero catch not included in the mean*

Table 15 estimates projected monthly cumulative catch of MHI Deep 7 bottomfish based on reported monthly mean and reported monthly maximum catches from Table 14 above.

Table 15. Projected cumulative catch of MHI Deep 7 bottomfish based on reported monthly mean and maximum catches

Month	Based on Monthly Mean*	Based on Monthly Max
Sep	17,489.28	46,872.00
Oct	45,687.80	86,815.00
Nov	72,253.55	122,239.10
Dec	122,964,10.00	189,564.10
Jan	155,105.50	239,134.70
Feb	185,005.30	288,496.80
Mar	203,567.70	320,294.00
Apr	216,357.20	349,253.40
May	233,186.20	384,869.40
Jun	242,677.20	395,710.00
Jul	251,948.00	402,838.50
Aug	261,717.60	412,608.10

** Months with zero catch not included in the mean*

Ex-Vessel Value and Revenue

The average monthly price of MHI Deep 7 bottomfish preliminarily estimated in 2010 dollars is $5.93 (Hospital, PIFSC, May 25, 2011, pers. comm.). Based on total reported catches of 268,089 lb for fishing year 2010-11 (HDAR 2010), the total ex-vessel value of MHI Deep 7 bottomfish across the commercial sector in 2010 was approximately $1.59 million.

These values do not take into account that employment and income are also generated indirectly within the State by commercial and non-commercial fishing for bottomfish. The fishery has an economic impact on businesses whose goods and services are used as inputs in the fishery, such as fuel suppliers, chandlers, gear manufacturers, boatyards, tackle shops, ice plants, bait shops, and insurance brokers. In addition, the fishery has an impact on businesses that use fishery products as inputs for their own production of goods and services. Firms that buy, process, or distribute fishery products include seafood wholesale and retail dealers, restaurants, hotels, and retail markets. Both the restaurant and hotel trade and the charter fishing industry are closely linked to the tourism base that is so important to Hawaii's economy. Finally, people earning incomes directly or indirectly from the fishery make expenditures within the economy as well, generating additional jobs and income. However, a more detailed assessment of the contribution of the Deep 7 bottomfish fishery to the state's economy is currently not available.

3.8.4 Environmental Justice Communities

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, signed in 1994, requires Federal agencies to consider the impacts of proposed actions on members of minority and low-income communities to ensure that disproportionately high and adverse human health or environmental effects on these

communities are identified and addressed. Minority and low-income populations are defined as follows:

> ***Minority Populations.*** People of Hispanic origin, Blacks, American Indians and Alaska Natives, Asians, Native Hawaiian and Other Pacific Islanders, as well as those individuals who categorized themselves as "two or more races" or "some other race" on the Census 2000 questionnaire.
>
> ***Low-Income Populations.*** People living below the poverty level.

The MHI bottomfish fishery includes participants that are in both the minority population and low-income population groups. Therefore, this environmental assessment will consider whether there would be disproportionately high and adverse impacts on the environment or on the health of these members of the MHI Deep 7 bottomfish fishery as a result of specifying an ACL for the 2011-12 fishing year.

3.8.6 Fishing Communities

The Magnuson-Stevens Act defines a fishing community as "...a community that is substantially dependent upon or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew, and fish processors that are based in such communities" (16 U.S.C. § 1802(16)). NMFS further specifies in the National Standard guidelines that a fishing community is "...a social or economic group whose members reside in a specific location and share a common dependency on commercial, recreational, or subsistence fishing or on directly related fisheries dependent services and industries (for example, boatyards, ice suppliers, tackle shops)".

National Standard 8 of the Magnuson-Stevens Act requires that conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and the rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (a) provide for the sustained participation of such communities and (b) to the extent practicable, minimize adverse economic impacts on such communities.

In 2002, the Council identified each of the islands of Kauai, Niihau, Oahu, Maui, Molokai, Lanai and Hawaii as a fishing community for the purposes of assessing the effects of fishery conservation and management measures on fishing communities, providing for the sustained participation of such communities, minimizing adverse economic impacts on such communities, and for other purposes under the Magnuson-Stevens Act. These definitions were subsequently approved by NMFS (68 FR 46112, August 5, 2003).

4.0 Anticipated Impacts of the Alternatives

The alternatives considered in this EA would specify an ACL for the MHI Deep 7 bottomfish stock complex that is equal to or greater than the catch limit of 254,050 lb specified for the 2009-10 fishing year (See Table 2). Except for Alternative 7, all of the ACL alternatives considered

are lower than the estimated OFL of 383,000 lb and are associated with probabilities of overfishing that are less than 50 percent (Alternative 7 includes an ACL specification that would be equal to the OFL). For each ACL alternative, a corresponding ACT would be specified at six percent below the ACL to prevent the ACL from being exceeded. When the ACT is projected to be reached, NMFS would close commercial and non-commercial fisheries for MHI Deep 7 bottomfish in federal waters through the end of the fishing. With higher catch limits, the fishing year is likely to be extended.

4.1 Impacts to Target Stocks

Alternative 1: Status Quo - Specify an ACL of 254,050 lb
Under this alternative, the ACL for the MHI Deep 7 bottomfish stock complex in fishing year 2011-12 would be set at 254,050 lb, which is identical to the catch limit specified for the 2010-11 fishing year. Based on the probabilities of overfishing contained in the 2010 bottomfish stock assessment update (Table 17. 1 in Brodziak et al. (in press), an ACL of 254,050 lb is associated with less than a 20 percent probability of overfishing the MHI Deep 7 bottomfish stock complex in fishing year 2011-12, lowering to less than a 19 percent probability of overfishing in 2012-13 fishing year. To ensure the ACL is not exceeded, an ACT of 238,000 lb would be specified.

Alternative 2: Specify an ACL between 255,000 and 295,900 lb
Under Alternative 2, the MHI Deep 7 bottomfish stock complex ACL would be specified at a value between 255,000 and 295,900 lb. An ACL within this range would be associated with a 20-29 percent probability of overfishing the MHI Deep 7 bottomfish stock complex, decreasing to approximately a 19-28 probability of overfishing if selected again for the 2012-13 fishing year. As an additional buffer to account for management uncertainty in controlling the actual catch at or below the ACL, an ACT would be used and specified between 239,700 and 278,150.

Alternative 3: Specify an ACL between 299,000 and 316,200 lb
Under Alternative 3, the MHI Deep 7 bottomfish stock complex ACL would be specified at a value between 299,000 and 316,200 lb. An ACL within this range would be associated with a 30-34 percent probability of overfishing the MHI Deep 7 bottomfish stock complex, decreasing to approximately a 29-33 probability of overfishing if selected again for the 2012-13 fishing year. As an additional buffer to account for management uncertainty in controlling the actual catch at or below the ACL, an ACT would be used and specified between 281,060 and 297,200 lb.

Alternative 4: Specify an ACL between 319,000 and 337,270 lb
Under Alternative 4, the ACL would be specified at a value between 319,000 and 337,270 lb. An ACL within this range would be associated with a 35-39 percent probability of overfishing the MHI Deep 7 bottomfish stock complex, decreasing to approximately a 34-38 probability of overfishing if selected again for the 2012-13 fishing year. As an additional buffer to account for management uncertainty in controlling the actual catch at or below the ACL, an ACT would be used and specified between 299,860 and 317,040 lb.

Alternative 5: Specify an ACL between 341,000 and 346,100 lb ***(Preferred)***
Under the preferred alternative, the ACL would be specified between 341,000 and 346,100 lb. For the 2011-12 fishing year, the ACL will be specified at 346,000 lb, which corresponds with a

40.8 percent probability of overfishing the MHI Deep 7 bottomfish stock complex in fishing year 2011-12 and 2012-13. This catch limit is 37,000 lb below the estimated OFL of 383,000 lb. As an additional buffer to account for management uncertainty in controlling the actual catch at or below the ACL, an ACT would be specified at 325,000 lb, or 21,000 lb lower than the ACL. Based on past fishery performance and the maximum overage of 18,200 lb, which occurred in fishing year 2008-09, the ACT is likely to be sufficient for ensuring the proposed ACL is not exceeded.

Alternative 6: Specify and ACL between 349,690 and 358,340 lb

Under Alternative 6, the MHI Deep 7 bottomfish stock complex ACL would be specified at a value between 349,690 and 358,340 lb. An ACL within this range would be associated with a 42-44 percent probability of overfishing the MHI Deep 7 bottomfish stock complex in fishing year 2011-12, remaining the same for the 2012-13 fishing year if selected again. An ACL within this range would exceed the Council's risk tolerance of 40.8 percent and the SSCs recommended ABC of 346,000 lb. However, from a strictly fishery management standpoint, depending on the specific ACL selected under this alternative, the catch limit would be between 33,310 to 24,660 lb lower than the estimated OFL of 383,000 lb. As an additional buffer to account for management uncertainty in controlling the actual catch at or below the ACL, an ACT would be used and specified between 328,710 and 336,840 lb. Depending on the specific ACL selected under this alternative, the difference between ACL and ACT would be between 20,980 and 21,500 lb. Based on past fishery performance and the maximum overage of 18,200 lb, which occurred in fishing year 2008-09, the ACT is likely to be sufficient for ensuring the ACL is not exceeded.

Alternative 7: Specify and ACL between 361,000 and 383,000 lb

Under Alternative 7, the MHI Deep 7 bottomfish stock complex ACL would be specified at a value between 361,000 and 383,000 lb. An ACL within this range would be associated with a 45-50 percent probability of overfishing the MHI Deep 7 bottomfish stock complex, remaining the same for the 2012-13 fishing year if selected again. An ACL within this range would exceed the Council's risk tolerance of 40.8 percent and the SSCs recommended ABC of 346,000 lb. However, from a strictly fishery management standpoint, an ACL under this alternative would have less than a 50 percent probability of overfishing. As a buffer to account for management uncertainty in controlling the actual catch at or below the ACL, the ACL would be reduced by six percent and set between 339,340 to 360,020 lb. The difference between ACL and ACT would be between 21,660 and 22,980 lb. Based on past fishery performance and the maximum overage of 18,200 lb, which occurred in fishing year 2008-09, the ACT is likely to be sufficient for ensuring the ACL is not exceeded.

Expected fishery outcome of the alternatives

It is unlikely that fishing participation will increase substantially as a result of specifying the ACL at any of the limits under consideration. All of the alternatives (except Alternative 1) would allow for an increased amount of catch compared with last year. Despite the opportunity this would provide in terms of a longer fishing season, none of the alternatives is expected to result in a large increase in fishery capacity. This is because, in general, the MHI bottomfish fishery is relatively stable and has not fluctuated widely in the past. A small number of participants are expected to join and leave the commercial and non-commercial sectors.

Those who did not participate in the bottomfish fishery when it operated under a TAC are not likely to enter the fishery with an increase in the catch limit because bottomfish fishing requires an initial investment in gear, development of expertise in deploying that gear, and acquisition of experience in locating quantities of target species. However, if active non-commercial MHI Deep 7 bottomfish fishermen who only operate in state waters decide to obtain a CML, the number of catch reports submitted and catch counted towards the ACL could increase, possibly in an amount equivalent to the current reported commercial catch as suggested by Brodziak et al. (in press). Currently, there is no incentive for non-commercial fishermen that only fish in state waters to obtain a CML therefore, the likelihood of a large change in the number of commercial fishery participants occurring is unlikely.

None of the alternatives are expected to increase a "race for the fish" (i.e., each fisherman tries to maximize his or her fishing before the catch limit is reached). This is because the catch limit would be the same as last year, or higher, which is expected to ease any additional competitive pressures. In addition, none of the alternatives considered are expected to increase the practice of high-grading (casting back smaller fish in favor of larger fish or less desirable species for more desirable species). High-grading carries with it the potential for mortality of discarded fish due to barotrauma impacts to fish that are not properly treated before release.

Although high-grading has not become an issue in this fishery, the Pacific Islands Fisheries Group (a contractor retained by NMFS) has developed methods for returning deepwater bottomfish to depth when there is evidence of barotrauma from the reduced pressure at the surface. The methods involve venting the swim bladder, pushing the protruding stomach back into the body cavity, and attaching a releasable weight to get the fish back to depth. These methods are currently being used by fishermen, but it is not known to what extent these methods are used fleet wide. The Council and NMFS will continue to monitor the impacts on the fishery on bycatch and will implement changes as necessary.

4.2 Impact to Non-Target and Bycatch Species

Alternatives 1-7 Status Quo (254,050 lb) to (383,000 lb)

Fishing for Deep 7 species is fairly target-specific, and the bycatch rate for non-target species is relatively low (approximately 8 percent) in this fishery. A relatively low catch limit could lead to increased discards of less desirable commercial species on small vessels with limited storage space. To minimize mortalities associated with discards, the Council and NMFS have implemented an educational program to teach fishermen how to release unwanted fishes and avoid excess mortality due to barotrauma. The current effort that goes into treating barotrauma fish by fishermen is not known.

At higher catch limits, there may be less incentive to high-grade – in the decade prior to establishment of the catch limit system (1996-2006), annual Deep 7 harvests ranged between 190,000-310,000 lb., demonstrating that the demand for MHI commercial Deep 7 bottomfish fishing may be lower than some of the higher catch limits considered.

Non-commercial fishermen in general are expected to have less targeting skill than commercial fishermen and, thus, may have higher non-target catches. They should, however, be less

influenced by market value and therefore may be expected to retain more non-target species than commercial fishermen. In all cases bycatch by MHI bottomfish fishermen is not anticipated to lead to significant adverse impacts on bycatch species stocks. Bycatch stocks are considered healthy and the increased impacts on bycatch species that would result from the catch limits considered here are not expected to significantly affect bycatch stocks or their prey, competitors and predators. The fact that all fish that are caught and discarded must be reported on Federal logbooks will help fishery managers to monitor bycatch and high-grading and address these topics in the future, as needed, to ensure that the fishery is not having a significant adverse impact on bycatch stocks.

Closure of the MHI bottomfish fishery upon reaching the catch limit could cause some fishery participants to move into the pelagic non-longline troll and handline fisheries. This potential displacement has not been specifically studied or quantified. A comparison of the commercial bottomfish and the commercial troll fishery finds that the 2009 MHI commercial bottomfish fishery had approximately 451 active commercial vessels and the Hawaii commercial troll fishery had 2,210 licensed fishermen who fished primarily for pelagic species. However, Hawaii's pelagic troll fishery (for yellowfin tuna) and the hook-and-line mackerel (akule and opelu) fishery are normally at their peak during the summer, and many of the fishermen who fish for bottomfish already shift to pelagic fisheries during the summer, so the increase in pelagic fishing due to the MHI bottomfish TAC may be minor.

4.3 Impacts on Protected Resources

Alternatives 1-7 Status Quo (254,050 lb) to (383,000 lb)
The impacts of the MHI bottomfish fishery on ESA listed species were considered in a Biological Opinion (BiOp) prepared by NMFS dated March 18, 2008, in accordance with section 7 of the Endangered Species Act. The BiOp determined that fishing activities conducted under the Hawaii FEP and its implementing regulations are not likely to jeopardize the continued existence of any endangered or threatened species under the jurisdiction of NMFS, or result in the destruction or adverse modification of critical habitat. None of the alternatives considered would modify operations of the bottomfish fishery in any way that would be expected to affect endangered or threatened species or critical habitat in any manner not previously considered in that consultation.

On June 2, 2011, NMFS published a proposed rule in the Federal Register (76 FR 32026) to designate terrestrial and marine habitat from 5 m inland from the shoreline extending seaward to the 500-m depth contour around all of the main Hawaiian Islands, including as critical habitat for Hawaiian monk seals. At this point in time there is insufficient information to determine the proposed designation's potential impacts on the MHI Deep 7 bottomfish fisheries (ECONorthwest, 2011). If the proposal is finalized, NMFS would re-initiate consultation under Section 7 of the ESA to determine the impact of fishing activities on critical habitat and any necessary management measures.

4.4 Impacts to EFH and HAPC

Alternatives 1-7 Status Quo (254,050 lb) to (383,000 lb)
Due to prohibitions on destructive fishing gear and the operations of the gear used, no adverse effects to water column EFH and HAPC (virtually all EEZ waters) have been attributed to bottomfish fishing in Hawaii (NMFS 2009). Because none of the alternatives considered here would allow destructive fishing gear or change the way fishing gear is currently deployed, they are not expected to lead to substantial physical, chemical, or biological alterations to the habitat, or result in loss of, or injury to managed species or their prey.

4.5 Effects on Fishery Participants and Fishing Communities

Accurately predicting the date on which the MHI Deep 7 bottomfish ACL will be reached is difficult, as fishing effort and catch are affected by many factors, including weather and ocean conditions and delays in catch data being submitted. The State's recent change from monthly to trip reporting is intended to address the latter. For the purposes of this analysis, the projected closure date for each alternative is based upon the estimated date attainment of the ACT would occur, assuming maximum monthly catches would be harvested. If catches are smaller than the previous monthly maximum, the fishery will remain open for a longer duration than projected in this analysis.

Alternative 1: Status Quo Specify an ACL of 254,050 lb
Based on maximum projected cumulative catches reported in Table 15, the ACT of 238,800 lb could be reached in late January 2012 and the fishery would be closed to prevent the ACL from being exceeded.

Based on the preliminary economic findings (Hospital, PIFSC, May 25, 2011, pers. comm.), the 2010 average price per pound for the MHI Deep 7 bottomfish species was $5.93 and assuming that all catches were sold, the ex-vessel value for the MHI commercial Deep 7 fishery under Alternative 1 is $1,506,516. Dividing these fleet totals equally among all 475 commercial vessels active during 2010 would yield potential per vessel gross revenue of $3,171. Fishing communities are expected to be adversely impacted under the status quo alternative because they make less revenue from provisioning fishing vessels with bait, tackle, ice, and fuel, as well as from the sales of harvested fish through wholesalers, retailers and restaurants, and would have fewer jobs created by these activities. Alternative 1 would not provide a large benefit to fishery participants in terms of providing the opportunity to optimize the use of the Deep 7 resource.

Alternative 2: Specify an ACL between 255,000 and 295,900 lb
Based on maximum projected cumulative catches reported in Table 15, the ACT associated with a catch limit of 255,000 lb (ACT=237,900 lb) could be reached in late January 2012 while the ACT associated with a ACL of 295,900 (ACT =278,150 lb) could be reached in mid to late February. However, if maximum monthly catches are not realized, the fishery would remain open for a longer duration. For example, if projected cumulative catches are based on monthly means reported in Table 15, an ACT of 237,900 lb could be reached in late May 2012 while an ACT of 278,150 lb may not be reached at all.

Based on the preliminary economic findings (Hospital, PIFSC, May 25, 2011, pers. comm.), the 2010 average price per pound for the MHI Deep 7 bottomfish species was $5.93 and assuming that all catches were sold, the ex-vessel value for the MHI commercial Deep 7 fishery under Alternative 2 ranges from $1,512,150 to $1,754,687. Dividing these fleet totals equally among all 475 commercial vessels active during 2010 would yield potential per vessel gross revenue between $3,183 and $3,694. Compared to Alternative 1, this alternative is expected to result in slightly more revenue for fishing communities from provisioning fishing vessels with bait, tackle, ice, and fuel as well as from the sales of harvested fish through wholesalers, retailers and restaurants, and the jobs created by these activities. However, revenues would be significantly less under this alternative compared to alternatives with higher ACLs. The full range of impacts to fishing communities under Alternative 2 compared to the status quo has not been quantified, but is expected to be positive. In summary, although Alternative 2 would provide for long-term conservation of the Deep 7 bottomfish resource, it would not allow fishery participants to optimize the Deep 7 resource.

Alternative 3: Specify an ACL between 299,000 and 316,200 lb

Based on maximum projected cumulative catches reported in Table 15, the ACT associated with a catch limit of 299,000 lb (ACT=281,060 lb) could be reached in late February 2012 while the ACT associated with a ACL of 316,200 (ACT =297,200 lb) could be reached in early to mid March 2012. However, if maximum monthly catches are not realized, the fishery would remain open for a longer duration. For example, if projected cumulative catches are based on monthly means reported in Table 15, an ACTs associated with this alternative may not be reached at all.

Based on the preliminary economic findings (J. Hospital, PIFSC, May 25, 2011, pers. comm.), the 2010 average price per pound for the MHI Deep 7 bottomfish species was $5.93 and assuming that all catches were sold, the ex-vessel value for the MHI commercial Deep 7 fishery under Alternative 3 ranges from $1,773,070 to $1,875,066. Dividing these fleet totals equally among all 475 commercial vessels active during 2010 would yield potential per vessel gross revenue ranging from $3,732 to $3,947. Fishing communities are expected to be a little impacted because they would benefit from provisioning fishing vessels with bait, tackle, ice, and fuel as well as from the sales of harvested fish through wholesalers, retailers and restaurants, and the jobs created by these activities. The full range of impacts to fishing communities under Alternative 3 compared to the status quo has not been quantified but is expected to be positive. In summary, although Alternative 3 would provide for long-term conservation of the Deep 7 bottomfish resource, it would not allow fishery participants to optimize the Deep 7 resources, but it would result in some additional positive community benefits as compared to Alternatives 1 and 2.

Alternative 4: Specify an ACL between 319,000 and 337,270 lb

Based on maximum projected cumulative catches reported in Table 15, the ACT associated with a catch limit of 319,000 lb (ACT=299,860 lb) could be reached in late mid to late March 2012 while the ACT associated with a ACL of 337,270 (ACT =317,040 lb) could be reached in late to March 2012. However, if maximum monthly catches are not realized, the fishery would remain open for a longer duration. For example, if projected cumulative catches are based on monthly means reported in Table 15, an ACTs associated with this alternative may not be reached at all.

Based on the preliminary economic findings (Hospital, PIFSC, May 25, 2011, pers. comm.), the 2010 average price per pound for the MHI Deep 7 bottomfish species was $5.93 and assuming that all catches were sold, the ex-vessel value for the MHI commercial Deep 7 fishery under Alternative 4 ranges from $1,891,670 to $2,000,011. Dividing these fleet totals equally among all 475 commercial vessels active during 2010 would yield potential per vessel gross revenue ranging from $3,982 to $4,211. Fishing communities are expected to be slightly positively impacted because they benefit from provisioning fishing vessels with bait, tackle, ice, and fuel as well as from the sales of harvested fish through wholesalers, retailers and restaurants, and the jobs created by these activities. The full range of impacts to fishing communities under Alternative 4 compared to the status quo has not been quantified but is expected to be positive. In summary, Alternative 4 would provide for long-term conservation of the Deep 7 bottomfish resource, and would allow fishery participants to harvest more Deep 7 fishes than Alternatives 1-3. It would, therefore, result in some additional positive community benefits compared to Alternatives 1, 2 and 3.

Alternative 5: Specify an ACL between 341,000 and 346,100 lb (Preferred)
Based on maximum projected cumulative catches reported in Table 15, the ACT associated with a catch limit of 341,000 lb (ACT=320,540 lb) could be reached in late March 2012 while the ACT associated with a ACL of 346,100 (ACT =325,340 lb) could be reached in early April 2012. However, if maximum monthly catches are not realized, the fishery would remain open for a longer duration. For example, if projected cumulative catches are based on monthly means reported in Table 15, an ACTs associated with this alternative may not be reached at all.

Based on the preliminary economic findings (Hospital, PIFSC, May 25, 2011, pers. comm.), the 2010 average price per pound for the MHI Deep 7 bottomfish species was $5.93 and assuming that all catches were sold, the ex-vessel value for the MHI commercial Deep 7 fishery under Alternative 5 ranges from $2,022,130 to $2,052,373. Dividing these fleet totals equally among all 475 commercial vessels active during 2010 would yield potential per vessel gross revenue ranging from $4,257 to $4,320. Fishing communities are expected to be more positively impacted because they benefit from provisioning fishing vessels with bait, tackle, ice, and fuel as well as from the sales of harvested fish through wholesalers, retailers and restaurants, and the jobs created by these activities. The full range of impacts to fishing communities under Alternative 5 compared to the status quo has not been quantified but is expected to be positive. In summary, Alternative 5 would provide for long-term conservation of the Deep 7 bottomfish resource, and would allow fishery participants to harvest Deep 7 fishes at a rate that the Council believes to be optimal. This alternative would result in additional positive community benefits compared to Alternatives 1-4, 6, and 7.

Alternative 6: Specify and ACL between 349,690 and 358,340 lb
Based on maximum projected cumulative catches reported in Table 15, the ACTs associated with alterative (ACT =328,710-336,840 lb, respectively) could be reached in mid April 2012. However, if maximum monthly catches are not realized, the fishery would remain open for a longer duration. For example, if projected cumulative catches are based on monthly means reported in Table 15, an ACTs associated with this alternative may not be reached at all.

Based on the preliminary economic findings (Hospital, PIFSC, May 25, 2011, pers. comm.), the 2010 average price per pound for the MHI Deep 7 bottomfish species was $5.93 and assuming that all catches were sold, the ex-vessel value for the MHI commercial Deep 7 fishery under Alternative 6 ranges from $2,073,662 to $2,124,956. Dividing these fleet totals equally among all 475 commercial vessels active during 2010 would yield potential per vessel gross revenue ranging from $4,366 to $4,474. Fishing communities are expected to be more positively impacted because they benefit from provisioning fishing vessels with bait, tackle, ice, and fuel as well as from the sales of harvested fish through wholesalers, retailers and restaurants, and the jobs created by these activities. The full range of impacts to fishing communities under Alternative 6 compared to the status quo has not been quantified, but is expected to be positive. In summary, although Alternative 6 would likely provide for long-term conservation of Deep 7 bottomfish, and would result in additional positive community benefits compared to Alternatives 1-5, the Council determined that setting an ACL with a risk of overfishing equal to or greater 42 percent was not necessary for the 2011-12 fishing year.

Alternative 7: Specify and ACL between 361,000 and 383,000 lb
Based on maximum projected cumulative catches reported in Table 15, the ACT associated with a catch limit of 361,000 lb (ACT=339,340 lb) could be reached in mid April 2012 while the ACT associated with a ACL of 383,000 (ACT =360,020 lb) could be reached in early May 2012. However, if maximum monthly catches are not realized, the fishery would remain open for a longer duration. For example, if projected cumulative catches are based on monthly means reported in Table 15, an ACTs associated with this alternative may not be reached at all.

Based on the preliminary economic findings (Hospital, PIFSC, May 25, 2011, pers. comm.), the 2010 average price per pound for the MHI Deep 7 bottomfish species was $5.93 and assuming that all catches were sold, the ex-vessel value for the MHI commercial Deep 7 fishery under Alternative 6 ranges from $2,140,730 to $2,271,190. Dividing these fleet totals equally among all 475 commercial vessels active during 2010 would yield potential per vessel gross revenue ranging from $4,507 to $4,781. Fishing communities are expected to be more positively impacted because they benefit from provisioning fishing vessels with bait, tackle, ice, and fuel as well as from the sales of harvested fish through wholesalers, retailers and restaurants, and the jobs created by these activities. The range of impacts to fishing communities under Alternative 7 compared to the status quo has not been quantified but is expected to be positive. In summary, although Alternative 7 would likely provide for long-term conservation of the Deep 7 bottomfish resource, and would result in additional positive community benefits compared to all other alternatives considered, the Council determined that setting an ACL with a risk of overfishing up to 50 percent (the maximum limit allowed for under National Standard 1) was not necessary for the 2011-12 fishing year.

4.6 Environmental Justice

Alternatives 1-7 Status Quo (254,050 lb) to (383,000 lb)
None of the alternatives for the proposed ACL specifications is expected to have a large or adverse environmental effect that could result in a disproportionately large and adverse effect on members of Environmental Justice populations. All fishery participants and communities would benefit from the management of the MHI Bottomfish Fishery under any of the ACL alternatives

because the ACL and AM management scheme provides for long term conservation of Hawaii's Deep 7 bottomfish resource.

4.7 Cumulative Impacts

Alternatives 1-7 Status Quo (254,050 lb) to (383,000 lb)
The specification of an ACL is intended to provide for the long-term sustainability of Hawaiian archipelagic bottomfish stocks and prevent overfishing from occurring. The individually insignificant impacts of specifying an ACL are due to the fact that the target resources will be managed for long-term sustainability and the annual catch limit and accountability measures will not change the conduct of the fishery. The low level of environmental effects would not become large when considered along with other actions or conditions that are affecting the MHI bottomfish fishery. The ACL is part of a suite of management measures that were designed to ensure the resources are sustainably managed in accordance with the Hawaii FEP and Amendment 3 to the Hawaii FEP. The specification of the 2011-2012 MHI Deep 7 bottomfish ACL is intended to continue to allow fishermen to fish sustainably and achieve optimum yields from bottomfish in the Main Hawaiian Islands and is compatible with the State of Hawaii's management of Deep 7 bottomfish in State waters.

The specification would not result in cumulative effects due to displacement into the pelagic fishery because the participants already participate in that fishery (which is also managed for sustainability) and because the larger catch limit is not likely to increase displacement. The proposed catch limit would also not result in large impacts to protected species or their habitat including areas proposed for critical habitat (see section 4.3). The ACL, ACT and AMs were also evaluated in the context of potential future climate change (see section 4.8), and there was no large impact on the environment that would result from the action when considered along with potential climate change impacts. This is because the ACL and ACT specifications were developed using the best available stock assessment data, and take into consideration the fact that catches are reported and followed during the season and the fishery is successfully closed when catches are nearing the management limits.

4.8 Effects of Climate Change

Studies on the impact of ocean circulation pattern have found that that large scale climate cycles affects winds, currents, ocean mixing, temperature regimes, and nutrient recharge, and in turn affect the productivity of all trophic levels in the North Pacific Ocean (Polovina et al. 1994). These impacts can result in variability in fish stock size, recruitment, growth rates, or other factors. Recently, NMFS PIFSC scientists studied the extent to which large-scale oceanographic and meteorological conditions covary with CPUE (in lb/trip) for Hawaii deep slope bottomfish community in the main Hawaiian Islands (Lee and Brodziak, 2011). They found that CPUE was significantly negatively correlated with Pacific decadal oscillation, which is characterized by changes in sea surface temperature, sea level pressure and wind patterns and manifested during "cool" or "warm" phases. The cross-correlation between CPUE and the 1-year lag PDO also indicated that there was a negative association between CPUE and the 1-year lagged PDO. These analyses provided support to the hypothesis that either the productivity or the depth distribution and associated catchability of Deep7 bottomfish resources in the Main Hawaiian Islands was

subject to low frequency forcing by the Pacific Decadal Oscillation. The findings of Lee and Brodziak (2011) were considered in the 2010 PIFSC MHI Deep 7 bottomfish stock assessment.

Climate change impacts to Deep 7 fishery resources were considered when the fishery catch limits were developed. Climate change impacts to protected resources were also considered by NMFS when it evaluated the potential impacts of the MHI bottomfish fishery on listed species. Managing the MHI bottomfish fishery using a catch limit is a conservative scheme and therefore, climate change is not expected to affect the effectiveness of the ACL as a means of ensuring the sustainability of the Deep 7 bottomfish resource. Because there are no large changes expected to occur in the MHI bottomfish fishery, there are no changes expected with respect to greenhouse gas emissions (GHGs), so no additional consideration regarding impacts from the proposed alternatives on GHG emissions is required.

4.9 Additional Considerations

4.9.1 Executive Order 12866

A "significant regulatory action" means any regulatory action that is likely to result in a rule that may –

1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal government or communities;
2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

This rulemaking has been determined to be not significant under E.O. 12866 because it will not: have an annual effect on the economy of $100M, create a serious inconsistency or otherwise interfere with an action taken or planned by another agency, materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof, or raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

4.9.2 Relationship between local short-term uses and maintenance and enhancement of long-term productivity

The relationship between local short-term uses (i.e., fishery outputs for the 2011-12 MHI bottomfish fishery under a specific ACL) and the enhancement of long-term productivity (i.e., preventing overfishing and long-term sustainability of the MHI bottomfish fishery) were considered by the Council in the recommendation of a 2011-12 ACL. The 2011-12 ACL will not result in overfishing of either the MHI Deep 7 bottomfish stock complex or the Hawaiian

Archipelago multi-species stock complex and is consistent with and strives for long-term sustainability of the MHI bottomfish fishery.

4.9.3 Irreversible and Irretrievable Commitments of Resources

None of the alternatives ACL specification alternatives considered would result in irretrievable or irreversible commitments of marine resources. The specification of an ACL for the MHI Deep 7 bottomfish stock complex in fishing year 2011-12 would not result in an irreversible impact such as extinction of fish stocks, listed species or other resources. Even if future stock assessments retroactively determined that the levels of catch considered here resulted in overfishing, the effects of that overfishing could be mitigated and reversed through future management measures.

None of the alternatives would result in displacement impacts (e.g., harvest of other target, non-target, bycatch, or impacts to protected resources) that would be irreversible or irretrievable. When the ACT is projected to be reached, the fishery would close to prevent the ACL from being exceeded and some fishermen may fish for pelagic MUS using troll and handline methods. The number of fishermen that would fish for PMUS during the bottomfish closed season is not known, although currently there appears to be movement from bottomfish into pelagic fisheries during the summer months when tuna are available. The requirements for reporting of bottomfish catches under State and Federal regulations include reporting interactions with protected resources and bycatch reporting. Therefore, regardless of which alternative is selected for implementation, the impacts on PMUS and other species affected by the commercial troll and handline pelagic fishery will continue to be monitored by fishery scientists who routinely collect, analyze and report on the information. The potential impact of additional fishing for PMUS in the MHI is not expected to be so high as to result in irreversible or irreversible levels of harvest.

4.9.4 Consultation and Coordination

Catch limits and the associated probabilities of overfishing described in this document were based upon the most recent PIFSC stock assessment for the MHI Deep 7 bottomfish stock complex (Brodziak, et al., in press), which was endorsed by the Council and the Council's Scientific and Statistical Committee at the 150th and 106th meetings, respectively. The proposed action described in this EA was developed in coordination with various federal and local government agencies that are represented on the Council, including Hawaii Department of Land and Natural Resources, NMFS, the U.S. Coast Guard and the U.S. Fish and Wildlife Service. This EA was developed by NMFS PIRO, with assistance from Council staff and was reviewed by NOAA NEPA specialists.

Implementation of the ACL for the MHI Deep 7 bottomfish stock complex for the 2011-12 fishing year will be coordinated with the Hawaii Coastal Zone Management Program as part of a federal consistency determination in accordance with the Coastal Zone Management Act. The proposed specification is not likely to change the current fishery with the exception of possibly allowing the fishery to remain open longer than the 2010-11 fishing year. On December 7, 2010, the Hawaii CZM Program clarified that the ACL and accountability measures are implementing measures of the FEP. Therefore, the proposed ACL specification is not subject to federal consistency review by the Hawaii CZM Program.

4.9.5 Preparers and Reviewers

This EA was prepared by Jarad Makaiau, NMFS PIRO, Sustainable Fisheries Division. NOAA General Counsel Pacific Islands, Council staff, and PIFSC staff assisted in preparing this EA.

Reviewers included (in alphabetical order):

- Ethan Brown, NMFS PIRO, Sustainable Fisheries Division
- Phyllis Ha, NMFS PIRO, Sustainable Fisheries Division
- Marilyn Luipold, NMFS PIRO, NEPA Coordinator
- Lewis Van Fossen, NMFS PIRO, Sustainable Fisheries Division

5.0 References

Brodziak, J. 2008. An assessment of the risk of archipelagic overfishing for alternative total allowable catches of deep-7 bottomfish in the main Hawaiian Islands. Pacific Islands Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Pacific Islands Fish. Sci. Cent. Admin. Rep. H-08-03, 31 p.

Brodziak, J., R. Moffitt, and G. DiNardo. 2009. Hawaiian bottomfish assessment update for 2008. Pacific Islands Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Pacific Islands Fish. Sci. Cent. Admin. Rep. H-09- 02, 93 p.

Brodziak, J., D. Courtney, L. Wagatsuma, J. O'Malley, H. Lee, W. Walsh, A. Andrews, R. Humphreys, and G. DiNardo. (in press). Stock assessment of the main Hawaiian Islands deep 7 bottomfish complex through 2010. Pacific Islands Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Pacific Islands Fish. Sci. Cent.

Carretta, J., K. Forney, E. Oleson, K. Martien, M. Muto, M. Lowry, J. Barlow, J. Baker , B. Hanson, D. Lynch, L. Carswell, R. Brownell Jr., J. Robbins, D. Mattila, K. Ralls, and M. Hill. 2010. Draft U.S. Pacific marine mammal stock assessment: 2010. NOAA-TM-NMFS-SWFSC-XXX. U.S. Department of Commerce. National Oceanic and Atmospheric Administration. National Marine Fisheries Service. Southwest Fisheries Science Center.

Courtney, D. and J. Brodziak. 2011. Review of unreported to reported catch ratios for bottomfish resources in the Main Hawaiian Islands. PIFSC Internal Report, PIFSC, 2570 Dole Street, Honolulu, HI 96822, 60 p.

Department of Business, Economic Development and Tourism (DBEDT). 2010. The State of Hawaii Data Book, 2009. Honolulu, HI.

Department of Business, Economic Development and Tourism (DBEDT). 2011. Historical Visitor Statistics (Table 4: Visitors staying overnight or longer: 1927-2009). Accessed at http://hawaii.gov/dbedt/info/visitor-stats on April 8, 2011.

ECONorthwest. 2011. Draft economic analysis of critical habitat designation for the Hawaiian monk seal. Prepared for the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Islands Fisheries Science Center. January 2011.

Everson (1984). Spawning and gonadal maturation of the ehu, *Etelis carbunuculus*, in the Northwestern Hawaiian Islands. Proceedings of the Second Symposium on Resource Investigations in the Northwestern Hawaiian Islands. Sea Grant Misc. Report 84-01, vol. 2: 128-148.

Hamm, D.C., M.M.C. Quach, K.R. Brousseau, and C.J. Graham. 2010. Fishery statistics of the western Pacific, Volume 25. Pacific Islands Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Pacific Islands Fish. Sci. Cent. Admin. Rep. H-10-03, Section D: State of Hawaii 2008 Fishery Statistics.

HDAR (Hawaii Division of Aquatic Resources). 2010. Bottomfish news. Volume 8. June 2010.

Hospital, J. 2010. Hawaii bottomfish survey: 2010 preliminary results. National Marine Fisheries Service, Pacific Islands Fisheries Science Center. November 2010 [Brochure] 8 pp.

Ito, B and R. Uchida. 1980. Results of ciguatera analysis of fishes in the Northwestern Hawaiian Islands. In: Grigg RW and Pfund RT (eds.). Proceedings of the Symposium on Status of Resource Investigations in the Northwestern Hawaiian Islands, April 24-25, 1980, University of Hawaii, Honolulu, Hawaii. Sea Grant Misc. Rep. UNIHI-SEAGRANT-MR-80-04, p. 81-89.

Kawamoto, K., and D. Gonzales. 2005. Summary of main Hawaiian Island catch disposition in the bottomfish fishery, 2003-2004. Pacific Islands Fisheries Science Center Internal Report IR-05-023, 9 pp.

Kelley, C. and Moffitt, R. 2004. The impacts of bottomfishing on Raita and West St. Rogatien Reserve Preservation Areas in the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve. Final Report submitted to the National Marine Sanctuaries Program. Hawaii Undersea Research Laboratory and NOAA NMFS Pacific Islands Fisheries Science Center.

Kikkawa, B.S. 1980. Preliminary study on the spawning season of the opakapaka, *Pristipomoides filamentosus*. Proceedings of the Symposium on Resource Investigations in the Northwestern Hawaiian Islands. Sea Grant Misc. Report 80-04, vol. 2: 226-232.

Lee, H.H. and J. Brodziak. 2011. Investigation of the association between Hawaii deep slope bottomfish CPUE and environmental variables. PIFSC Internal Report, PIFSC, 2570 Dole Street, Honolulu, HI 96822, 12 p.

Moffitt, R.B., D.R. Kobayashi, and G.T. DiNardo. 2006. Status of the Hawaiian bottomfish stocks, 2004. Pacific Islands Fisheries Science Center, National Marine Fisheries Service, NOAA, Honolulu, HI. PIFSC Admin. Rept. H-06-01. 45 pp.

Nitta, E.T., and J.R. Henderson (1993) A review of interactions between Hawaii's fisheries and protected species. Marine Fisheries Review. 55(2): 83–92.

National Marine Fisheries Service (NMFS). 2008. Endangered Species Act – Section 7 Consultation. Biological opinion and incidental take statement for Amendment 14 to the Bottomfish Fishery Management Plan. Implementation of bottomfish fishing regulations within federal waters of the main Hawaiian Islands. National Marine Fisheries Service, Pacific Islands Region, Protected Resources Division.

NMFS. 2009. Environmental Assessment. Specification of a total allowable catch for the main Hawaiian Islands deep 7 bottomfish for 2009-10 fishing year. August 12, 2009.

Parke, M. 2007. Linking fishermen reported system commercial bottomfish catch data to habitat and proposed restricted fishing areas using GIS and spatial analysis. U.S. Dept. of Commerce. NOAA Tech. Mem., NOAA-TM-NMFS-PIFSC-11. Pacific Islands Fisheries Science Center. Honolulu, HI.

Parrish, J., G. Aeby, E. Conklin, G. Ivey and B. Schumacher. 2000. Interactions of non-indigenous blueline snapper (taape) with native fishery species. Final report submitted to the State of Hawaii Department of Land and Natural Resources. August 31, 2000.

Polovina, J., G. Mitchum, N. Graham, M. Craig, E. DeMartini, and E. Flint. 1994. Physical and biological consequences of a climate event in the Central North Pacific. Fisheries Oceanography 3(1): 15–21.

Ralston, S., and G. Miyamoto. 1983. Analyzing the width of daily otolith increments to age the Hawaiian snapper, *Pristipomoides filamentosus*. Fishery Bulletin 81(3): 523-535.

Stokes, K. 2009. Report on the Western Pacific stock assessment review 1 Hawaii deep slope bottomfish. Center for Independent Experts, stokes.net.nz Ltd., Wellington 6035, New Zealand, 27 p.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS), and U.S. Department of Commerce, Bureau of the Census. 1996 National survey of fishing, hunting, and wildlife-associated recreation.

WPFMC (Western Pacific Fishery Management Council) 2007. Amendment 14 to the Fishery Management Plan for Bottomfish and Seamount Groundfish Fisheries of the Western Pacific Region including a Final Supplemental Environmental Statement. Western Pacific Fishery Management Council, Honolulu, HI.

Appendix 1: Range of Catches and the Associated Probability of Overfishing

Table 17.1 Stock assessment projection results showing the total allowable commercial catches (1000 pounds) of Deep 7 bottomfish in fishing years 2012 and 2013 that would produce probabilities of overfishing in 2012 of 0%, 5%, 10% …, 50% and greater under baseline catch Scenario II and CPUE Scenario I.

Catch Scenario II and CPUE Scenario I				
Probability of Overfishing Deep7 Bottomfish in the Main Hawaiian Islands in Fishing Year 2012	Total Allowable Commercial Catch (1000 pounds) of Deep7 Bottomfish in Fishing Years 2012 and 2013	Probability of Overfishing Deep7 Bottomfish in the Main Hawaiian Islands in Fishing Year 2013	Median Ratio of Deep7 Bottomfish Exploitable Biomass in 2013 to BMSY	Probability That Deep7 Bottomfish Biomass in 2013 Is Greater Than the Minimum Stock Size Threshold (0.7*BMSY)
0	11	0	1.05	0.92
0.05	147	0.02	1.03	0.91
0.10	197	0.09	1.02	0.90
0.15	229	0.14	1.02	0.90
0.20	255	0.19	1.01	0.89
0.25	277	0.24	1.01	0.89
0.30	299	0.29	1.01	0.89
0.35	319	0.34	1.00	0.88
0.40	341	0.39	1.00	0.88
0.45	361	0.45	1.00	0.88
0.50	383	0.50	0.99	0.88
0.55	407	0.56	0.99	0.87
0.60	429	0.60	0.99	0.87
0.65	455	0.66	0.98	0.87
0.70	481	0.71	0.98	0.86
0.75	513	0.76	0.97	0.86
0.80	549	0.81	0.97	0.85
0.85	597	0.86	0.96	0.84
0.90	665	0.91	0.95	0.83
0.95	783	0.96	0.93	0.81
0.99	1001	0.99	0.90	0.77

Source: Brodziak et al. (in press)

DRAFT

Appendix 2: Final Report of the P* and SEEM Working Groups

WESTERN PACIFIC REGIONAL FISHERY MANAGEMENT COUNCIL

Final Report of the P* and SEEM Working Groups: Deliberations for the Main Hawaiian Island Deep 7 Bottomfish Complex ACL

151st Council Meeting
Honolulu, HI

The Council, at its 150th Council meeting, recommended the creation of the P* Working Group and SEEM Working Group (WG) to address the ACL determination for the Main Hawaiian Island Deep 7 Bottomfish stock complex. The P* Working Group was to develop a methodology to determine Council's acceptable risk of overfishing, or P*, to use in the ABC determination, and the SEEM Working Group was to develop a methodology for quantifying social, economic, ecological, and management uncertainty factors for the ACL specification. Both groups met twice since the 150th Council meeting and successfully responded to the Council's request.

Determination of the Risk of Overfishing, P*

The P* WG utilized the dimensions presented previously in the amendment document:

1. Assessment information,
2. Assessment uncertainty,
3. Stock status, and
4. Productivity and susceptibility.

The WG developed a scoring system as well as established the categories within each dimension. The P* WG chose to use scores for each dimension as high as 10, such that the dimensions added up to a maximum of 40. The summed score is subtracted from the P^*_{MAX} of 50% OFL, or a maximum of 50% risk of overfishing, to determine the P*. The justification was that the group thought the results of its deliberations should never result in a P* of zero, or no fishing, thus the lowest P* is equivalent to a 10% risk of overfishing.

For the first dimension, the P* WG created 6 levels starting from perfect assessment information in which the quantitative assessment provides estimates of exploitation and biomass, to poor assessment information for which there are no benchmark values and scarce or unreliable catch records (Table 1a). The P* WG scored various assessment aspects (Table 1b), which were then summed and scaled to fit within a scale of 0-2 (between the first two levels of the dimension). The resulting score was 1.3.

Table 1a. Dimension 1: Assessment Information

Assessment Information Description	Score
Perfect. Quantitative assessment provides estimates of exploitation and B; includes MSY-derived benchmarks	0.0
Quantitative assessment provides estimates of exploitation and B; includes MSY-derived benchmarks; no spatially-explicit information	2.0
Good. Measures of exploitation or B, proxy reference points, no MSY benchmarks; some sources of mortality accounted for	4.0
Relative measures of exploitation or B, proxy reference points, absolute measures of stock unavailable	6.0
No benchmark values, but reliable catch history	8.0
Poor. No benchmark values, and scarce or unreliable catch records	10.0

Table 1b. Assessment aspects used in determining the score for the first dimension

Assessment Aspects	Score
Reliable catch history	0
Standardized CPUE	0
Species-specific data	1
All sources of mortality accounted for	0.5
Fishery independent survey	1
Tagging data	1
Spatial analysis	1

(1 = not captured in the stock assessment, 0 = captured in the stock assessment)

The second dimension that addresses characterization of uncertainty had five levels ranging from complete uncertainty characterization to no uncertainty characterization (Table 2). The P* WG determined that the MHI Deep 7 stock assessment was well characterized, thus attributed a score of 0 to the uncertainty characterization description.

Table 2: Dimension 2: Uncertainty Characterization

Uncertainty Characterization Description	Score
Complete. Key determinant – uncertainty in both assessment inputs and environmental conditions included	0.0
High. Key determinant – reflects more than just uncertainty in future recruitment	2.5
Medium. Uncertainties are addressed via statistical techniques and sensitivities, but full uncertainty is not carried forward in projections	5.0
Low. Distributions of Fmsy and MSY are lacking	7.5
None. Only single point estimates; no sensitivities or uncertainty evaluations	10.0

The third dimension assesses the stock status by looking at biomass and fishing levels compared to reference points, including minimum stock size threshold (MSST), biomass at MSY (BMSY), fishing mortality (F), and maximum fishing mortality threshold (MFMT) (Table 3). The table of Biomass against Fishing Mortality (Table 3) was developed to create more reflective scores for the available scenarios of biomass level and fishing mortality level.

Table 3. Dimension 3: Stock Status

Stock Status Description	Biomass level and Fishing level	Score
Neither overfished nor overfishing.	Stock > MSST and B_{MSY}, F < MFMT	0.0
Neither overfished nor overfishing.	Stock > MSST, F < MFMT	2.0
Neither overfished nor overfishing.	Stock ≥ MSST, F ≤ MFMT	4.0
Stock is not overfished, overfishing is occurring	Stock >MSST, F > MFMT	6.0
Stock is overfished, overfishing is not occurring	Stock <MSST, F ≤ MFMT	8.0
Stock is overfished, overfishing is occurring	Stock <MSST, F > MFMT	10.0

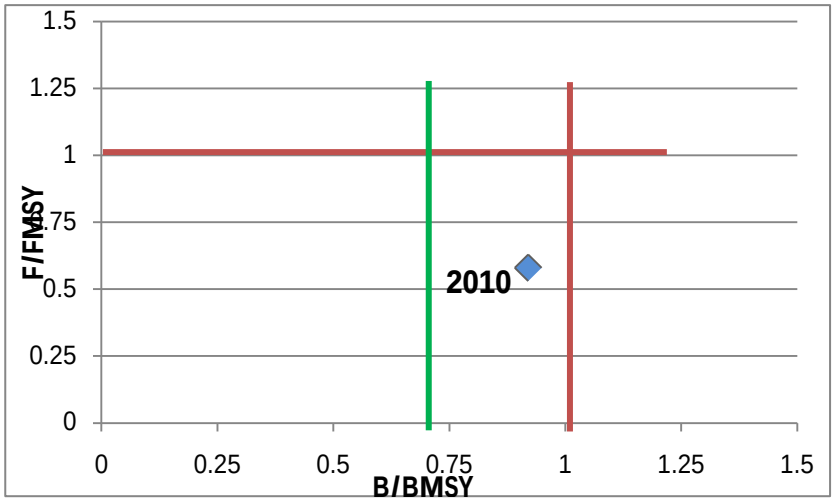
Table 4. Scores associated with different levels of biomass and fishing mortality.

		Biomass			
		Above B_{MSY}	Above MSST	Near* MSST	Below MSST
Fishing Mortality	Below MFMT	0	2.0	5.0	8.0
	Near* MFMT	1.0	3.0	6.0	9.0
	Above MFMT	2.0	4.0	7.0	10.0

*The definition of "near" for the purposes of the working group was "equal to or on the good side of," thus "near" for F/MFMT is equal to 1.0 or less, and "near" for B/MSST is 0.7 and above.

The P* Working Group discussed that, because the MHI Deep 7 Bottomfish stock complex has a B/B_{MSY} of 0.92 and F/ MFMT of 0.58, the stock is neither overfished nor is overfishing occurring, and it is well beyond its overfishing benchmark (Figure 1). However, the Stock Status score was raised from 2 to **3** because of concern about the stock assessment being conducted on a stock complex as opposed to individual stocks.

Figure 1. B/B_{MSY} to F/F_{MSY} plot for 2010 stock status.



The fourth dimension assesses the stock or stock complex's biological productivity and susceptibility to fishing. The P* WG defined 5 levels within the dimension (Table 5). The P* Working Group sought outside input from individuals with more expertise in bottomfish biology and ecology, namely Dr. Robert Humphreys and Dr. Robert Moffitt. The P* WG accepted the average of their scores to define the productivity and susceptibility for each fish within the MHI Deep 7 bottomfish complex (Table 6). This resulted in an overall score for this dimension of 4.9.

Table 5. Dimension 4: Productivity and Susceptibility

Productivity and Susceptibility Description	Score
Low risk. High productivity, susceptibility low.	0.0
Low/Medium	2.5
Medium risk. Moderate productivity, and susceptibility	5.0
Medium/High	7.5
High risk. Low productivity, high susceptibility	10

Productivity and Susceptibility were scored separately based on the scoring system below, and then the overall average is used as the final score for this dimension. Biological productivity was scored 0 if the fish has high productivity because its productivity directly impacts its ability to recover from any sort of depletion event, thus a fish with high productivity should impact the acceptable biological catch (ABC) less than a fish with low productivity. The more susceptible a fish is to fishing, i.e. the ease with which it is caught, the higher its susceptibility score, which will result in a greater impact on the ABC.

Productivity	Score
High	0
High/medium	2.5
Medium	5
Medium/low	7.5
Low	10

Susceptibility	Score
High	10
High/medium	7.5
Medium	5
Medium/low	2.5
Low	0

Table 6. Averages of biological productivity and susceptibility to fishing for each of the MHI Deep 7 bottomfish species from expert opinion

Species	Productivity	Susceptibility	Total	Average
Opakapaka	5	6.25	11.25	5.625
Onaga	5	5	10	5
Ehu	2.5	7.5	10	5
Hapuupuu	5	8.75	13.75	6.875
Gindai	3.75	5	8.75	4.375
Kalekale	2.5	3.75	6.25	3.125
Lehi	5	3.75	8.75	4.375
			Overall Average =	4.9

The final P* is the sum of the four dimensions subtracted from the P^*_{MAX} of 50 (or 50% OFL).

Dimension	Score
Assessment Information	1.3
Uncertainty Characterization	0
Stock Status	3
Productivity and Susceptibility	4.9
Final Score	**9.2**

The final P* is 40.8 (50-9.2), which corresponds to an ABC of 345,522 lb.

Determination of the SEEM Score

The social, economic, ecological, and management uncertainty (SEEM) analysis is used to reduce the ACL from the ABC, as well as determine the reduction to ACT if one is required. The analysis consists of four dimensions (social, ecological, economic, and management uncertainty) with factors that are ranked. The SEEM Working Group (WG) first considered factors that could be used in the four dimensions. Many of the considered factors were then consolidated with straw man factors to create overarching, applicable factor statements. Others, if viewed irrelevant to affecting the ACL, were dropped from consideration.

For the social dimension, many factors were considered that included food source, food security, preservation of a way of life, and historical dependence. The SEEM WG determined that the relevant factors for the social dimension included:

1. Perpetuates cultural and traditional values,
2. Provides symbolically-valued and culturally-important fish,
3. Bottomfish fishing is a unique, highly-skilled occupation that is waning and should be maintained, and
4. Contributes to Hawaii's food security.

The group felt it was important to capture the cultural and traditional values and practices associated with bottomfish in Hawaii. It was also important to emphasize that bottomfish fishing is very difficult and requires many years of experience to be successful. Additionally, fewer individuals are learning this occupation.

Many factors were considered for the economic dimension, including markets for the fishery, capitalization, price for fish, and tourism. The factors selected by the SEEM WG for scoring included:

1. There is economic reliance of other industries on the fishery,
2. Financial security of the fishery and its participants is readily compromised by Management decisions, and
3. Provides a unique product.

There was much discussion about the impacts of bottomfish fishing on other industries and multiplier effects. Bottomfish from Hawaii are a unique product that are never frozen, have a low carbon footprint (not flown in and fishing grounds are close to landing sites), and are a signature fish in regional cuisine. Lastly, the financial security of the fishery as well as its participants is

readily compromised by management decisions, whether that be decisions for closed areas, TACs, or other measures that restrict the fishery. However, focus was drawn away from overall importance to the local economy because it was pointed out that all fishing in Hawaii contributes relatively little to the local economy. Also, while the group discussed including capitalization as a factor within the economic dimension, it was best suited for discussion purposes. Capitalization is not an issue in the MHI Deep 7 bottomfish fishery as in other regions. Thus it would be unfair to consider capitalization an important topic in the determination of the ACL. Lastly, carbon footprint was included under "unique product" because although it was initially discussed for inclusion as a stand-alone factor, it would be better used as a marketing tool than a factor upon which to base an ACL.

Many factors were considered for the ecological dimension, including key indicator species, depth range overlaps of bottomfish species, impacts of the fishery, impacts of population booms of particular species, and the loss of a fish species due to kahala. The factors that were ultimately selected for use in scoring were:

1. Uncertainty of ecosystem dynamics, and
2. Shift of fishing pressure onto species outside Deep 7 upon closure of Deep 7 fishery.

The group chose to lump many considered factors into uncertainty of ecosystem dynamics, capturing the fact we do not know what happens with a reduction on one or more species within the bottomfish complex. Similarly, it is unknown if there are distinct niches that one or more of the species fill or if any are indicators of ecosystem function. It was determined that CPUE and catchability being influenced by weather was more appropriate for the management uncertainty dimension.

The last dimension is management uncertainty. The WG brainstormed factors such as quantification of catch, high-grading issues, complicated reporting, and risk of exceeding the limit. However, the group determined that many of the items could be encompassed in 5 major overarching factors:

1. Unreported recreational landings,
2. Commercial catch reporting, including misreporting,
3. Weather influences ability to fish and productivity of fishing,
4. Monitoring, including ability to forecast, and
5. Recreational discard mortality associated with high-grading.

The group concluded that monitoring and reporting should be considered separately, and that recreational and commercial reporting should be divided to avoid the "double barrel" problem where one item should receive one score, but another item should receive a lower or higher score. In this case, the group felt that commercial data is significantly better and greater than recreational data (there is no mandatory recreational reporting, only catch estimates from surveys). There were also concerns voiced about discard mortality associated with recreational fishing – if one can only catch five fish, the goal may be to catch the biggest fish. Lastly, the group decided weather should be included in management uncertainty. If the weather is calm and the fishermen are close to reaching the limit, then arguably they will reach it faster and perhaps faster than current monitoring accounting. On the other hand, if weather is bad and the closure date is set, the fishery may not come close to the predicted target. There were suggestions during

this conversation to make the information about the various fishermen more precise, which included more questions on the bottomfish fishing vessel registration pertaining to the type and frequency of fishing that will be taking place. Currently, there are no details about primary fishing activity captured on the registration.

The group created a scoring system that is currently based on a -2 to 2 scale. First, the individuals within the group selected scores for each factor within the dimensions. Next, the scores were summed for each dimension. The average of the group was then calculated for each dimension. Upon assessing the results, all had selected primarily positive scores for the social, economic, and ecological dimensions, and primarily negative scores for the management uncertainty dimension. The end result was a net positive score, which would mean the ACL would be greater than the ABC recommended by the Council. As a result, the group decided to utilize the first three dimensions as justification for maintaining the ACL equal to ABC, and then utilizing the management uncertainty to reduce the limit to the ACT. The group concluded that using an ACT would buffer against the risk of exceeding the ACL, thus removing the need for the fishery to pay back any overages or for the system to be revised. Past experience shows that the fishery typically goes over their TAC, but by only a small percentage. Penalizing the fishermen because the system is unable to work perfectly is inequitable. Below are the tables used for scoring, as well as a table with averages.

SOCIAL DIMENSION

Selected Factors	**Score**				
Perpetuates cultural and traditional values	-2	-1	0	1	2
Provides symbolically-valued and culturally-important fish	-2	-1	0	1	2
Bottomfish fishing is a unique, highly-skilled occupation that is waning and should be maintained	-2	-1	0	1	2
Contributes to Hawaii's food security	-2	-1	0	1	2

ECONOMIC DIMENSION

Selected Factors	**Score**				
There is economic reliance of other industries on the fishery (multiplier effect)	-2	-1	0	1	2
Financial security of the fishery and its participants is readily compromised by management decisions	-2	-1	0	1	2
Provides a unique product (never frozen, fresh, low carbon footprint, signature fish in regional cuisine)	-2	-1	0	1	2

ECOLOGICAL DIMENSION

Selected Factors	**Score**				
Uncertainty of ecosystem dynamics	-2	-1	0	1	2
Shift of fishing pressure onto species outside Deep 7 upon closure of Deep 7 fishery	-2	-1	0	1	2

MANAGEMENT UNCERTAINTY DIMENSION

Selected Factors	Score				
Unreported recreational landings	-2	-1	0	1	2
Commercial catch reporting, including misreporting	-2	-1	0	1	2
Weather influences ability to fish and productivity of fishing	-2	-1	0	1	2
Monitoring, including ability to forecast	-2	-1	0	1	2
Recreational discard mortality associated with high-grading	-2	-1	0	1	2

TABLE of AVERAGES

Dimension	Person 1	Person 2	Person 3	Person 4	Person 5	Person 6	Person 7	Person 8	Person 9	Person 10	Ave-rage
Social	5	7	6	5	6	7	5	2	6	7	5.6
Economic	6	5	6	5	6	6	4	1	5	5	4.9
Ecological	-1	-1	2	-1	0	1	0	2	0	-1	0.1
Management Uncertainty	-7	-5	-5	-7	-5	-10	-6	-3	-8	-4	-6

Based on the tables above, the SEEM WG determined that the ACL should be equal to the ABC, but the ACT should be reduced from the ACL by 6 percent to account for management uncertainty. The working group is comprised of 12 individuals, which includes Council staff. Council staff did not participate in the scoring exercise, thus the average represents the input from the commercial bottomfish fishery, State of Hawaii, and representatives with social, economic, and biological expertise.

The results of this working group are captured by the following statement:

> There was a consensus in the SEEM Working group that, for the Main Hawaiian Islands bottomfish Deep 7 fishery, the annual catch limit (ACL) be set equal to the acceptable biological catch (ABC), and that the score of 6 percent from the management uncertainty dimension be used to set the annual catch target (ACT) as a reduction from the ACL. The social, economic, and ecological dimensions demonstrate the importance of the Deep 7 bottomfish fishery to the State of Hawaii.

Conclusions for the MHI Deep 7 Bottomfish Fishery

Based on the analyses by the P* WG, the P* WG determined that the P* should be 40.8, which corresponds to an ABC of 345,522 lb. The SEEM WG analyses resulted in the consensus statement that the ABC should equal ACL, and an ACT should be used that is 6 percent less than the ACL, which equals 324,790 lb.